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The Canadian Builder and Carpenter

PUBLISHED ONCE A MONTH BY THE COMMERCIAL PRESS, LIMITED

Vol. 4 TORONTO, SEPTEMBER, 19 No. 9

C A Bradshaw
153 Davenport Rd
TORONTO ONT

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OF TORONTO

Uncle Si Says:

"There's a guarantee that goes with every Simonds Saw that I like to read over now and then. It goes this way: 'If at any time the user of a Simonds Saw finds anything wrong with it, he's got a new saw coming, or can have his money returned. You're the man that's got to be satisfied. You can't own a Simonds Saw and be dissatisfied.' Pretty plain English, isn't it? But then the Simonds is so good that it can stand a strong guarantee like that. You know where they sell them, don't you?"

When You Buy Your Next Hand Saw get the famous, service-giving

SIMONDS
Hand Saw

It is the Saw that is the result of 83 years edged tool manufacturing experience. We make every part of it from the raw material to the finished product. You can buy this Saw at your Hardware Dealer's if he has an up-to-date stock of tools, or we will select one for you for $2.50 and send it to you, and you may be sure this will be the most satisfactory saw you ever had. The blade is full taper ground, crucible steel. The handle is carved apple wood, thoroughly seasoned. Each saw is absolutely guaranteed.

A FREE BOOKLET

Every Carpenter should have a copy of "Simonds Carpenter Rule Booklet," which we furnish upon request. Lots of good information in it, also a further description of Simonds Saws.

Simonds Canada Saw Co. Limited

St. Remi Street and Acorn Ave.
Montreal Quebec

St. John, N.B Vancouver, B.C.

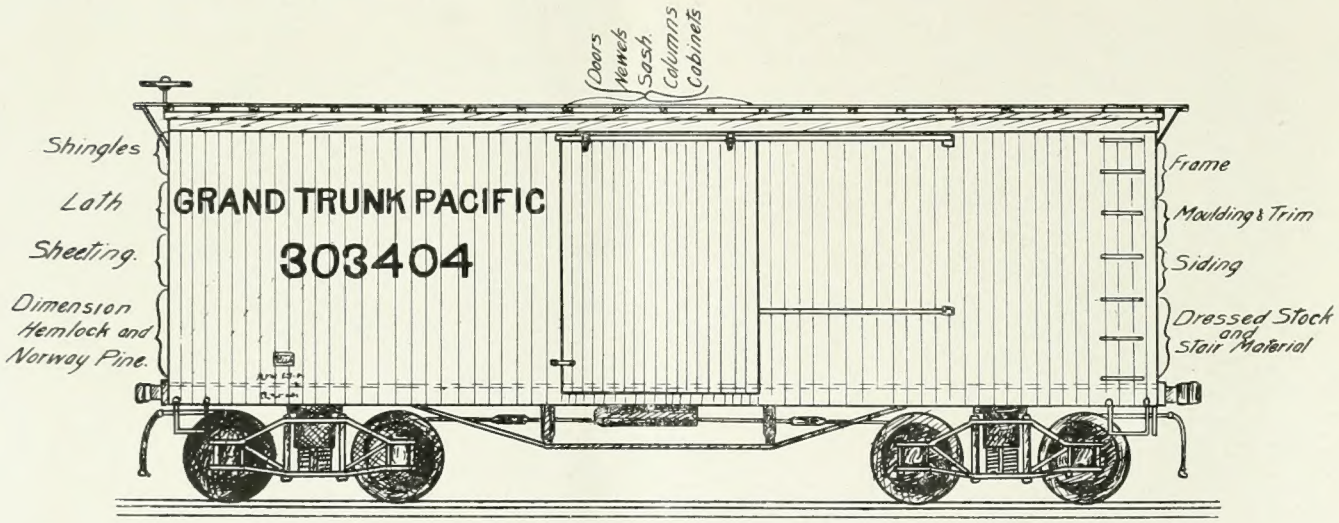
Midland Planing Mill Products

The Leading Stock Lines

Mixed Cars

We handle all the different kinds of wood materials used in building houses and manufacture the most of the raw materials right from the tree at our sawmill at Thunder Bay.

We can fill your order right out of stock with all the timbers, studding, sheeting, siding and other bill stuff required, load it into a car within a couple of days, and finish the car with the frames, sash, doors, mouldings, etc., etc.



You save time, and your time is money in your pocket. When you get the car, you are ready to rush the job, and a quick job always makes money.

Send your lists for quotations, f.o.b. your station.

N.B.—War Discounts are now in effect

Georgian Bay Shook Mills, Limited

MANUFACTUPERS FROM THE TREE TO THE FINISHED PRODUCT

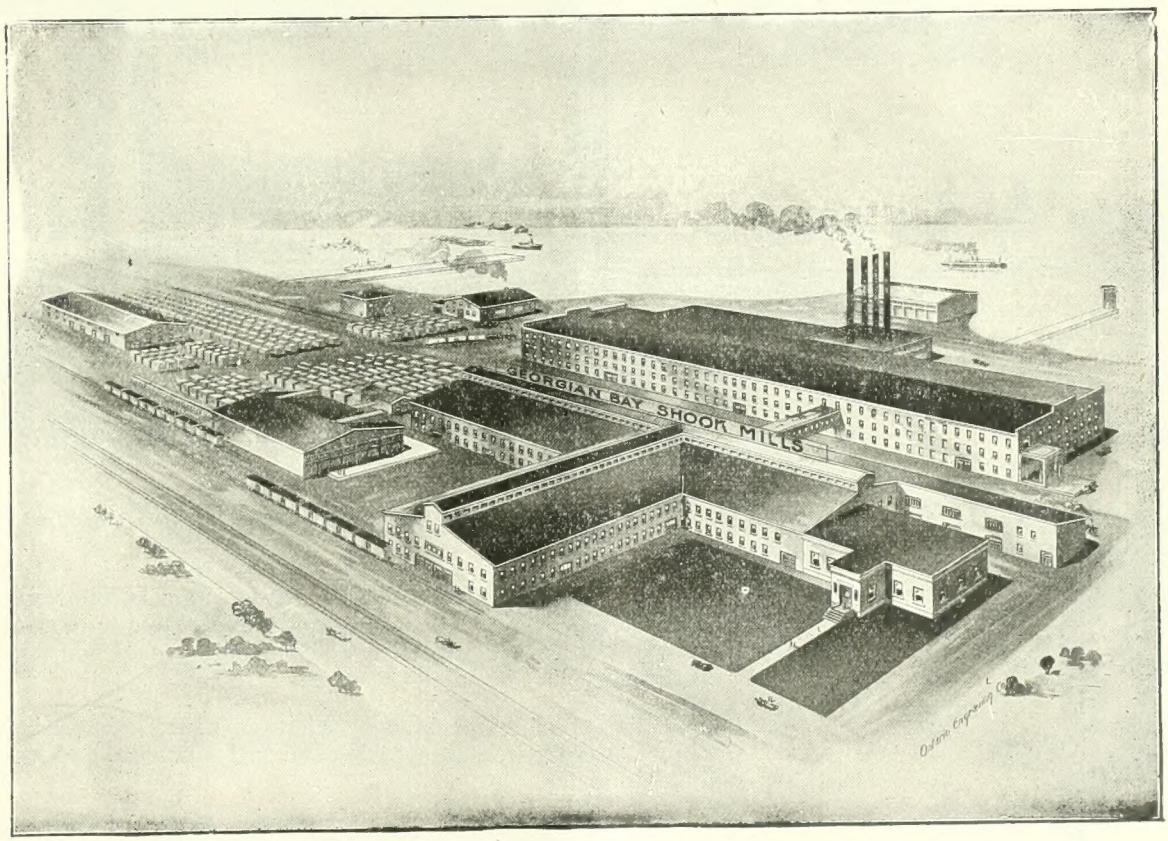
Midland, Ontario

Midland Planing Mill Products

The Leading Stock Lines

War Announcement

The Field covered by this firm extends over the whole of Canada, and especially the provinces north and east of the Great Lakes.
On account of the War, building operations are being restricted, and many Planing Mills, supplying only Local Trade will find it hard to obtain sufficient orders to warrant running their plant.
To enable such as these to retain their trade during the War Times, the Georgian Bay Shook Mills, Limited, offers special facilities and inducements.



The Largest Plant in Canada, Manufacturing Planing Mill Products (Located in the Heart of Canadian Lumbering District)

Carrying at all times large stocks of lumber of all kinds, and manufacturing every kind of Millwork, we are able to supply all wants, and make prompt shipments. There is no job too large or too small for us to handle.

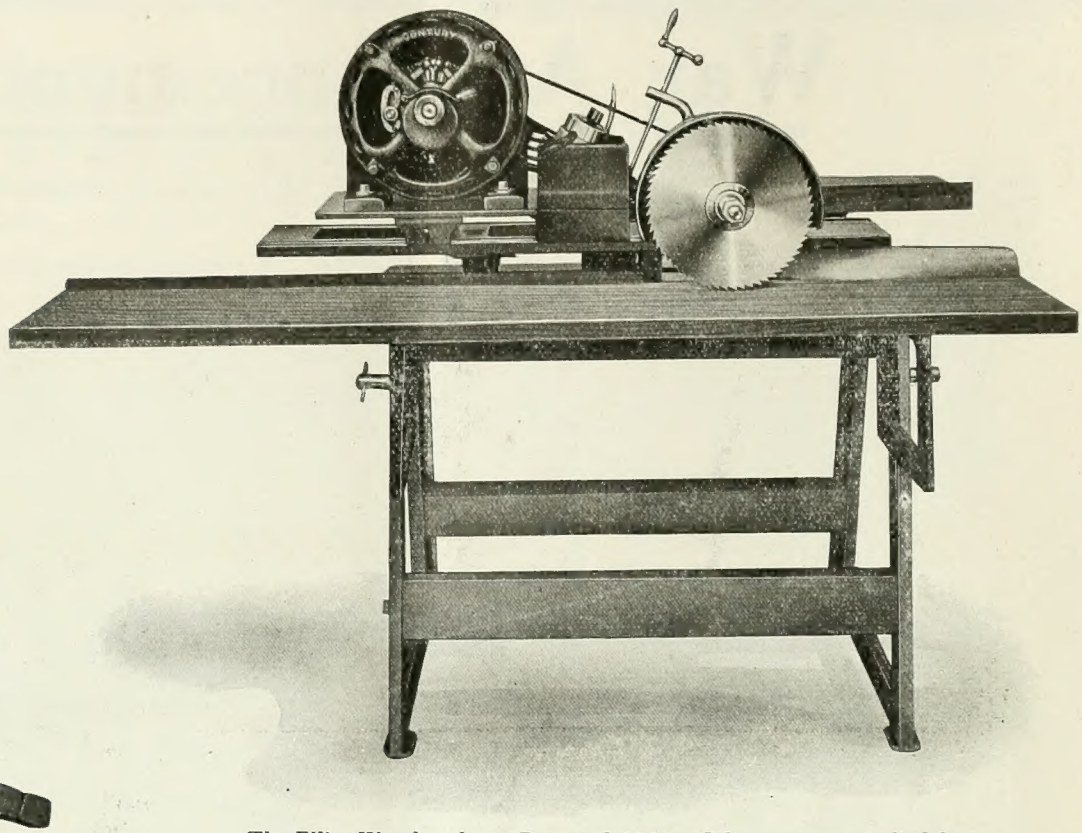
Send for our Catalog with Special War Discounts

Georgian Bay Shook Mills, Limited

MANUFACTURERS FROM THE TREE TO THE FINISHED PRODUCT

Midland, Ontario

The Elliot Woodworker will Save You Money

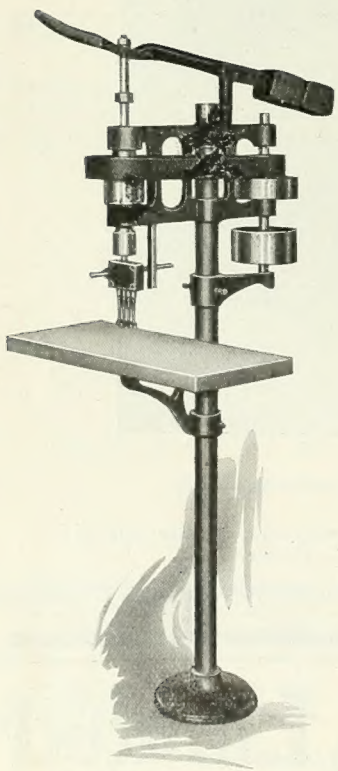


The Elliot Woodworker. Patented 1910. Other patents applied for.

Wm. Scott, Builder, Danforth Ave., says: "I am safe in saying that I have saved over two thousand dollars in a couple of years by having an Elliot Woodworker. The machine paid for itself the first three weeks I had it."

The Elliott Boring machine is what carpenters have been looking for, because it is light, compact and portable, and very reasonable in price.

It will do the work of a machine costing two or three times as much money, and is especially useful for those who want the Grand Rapids Combination Bit for sash pulleys.

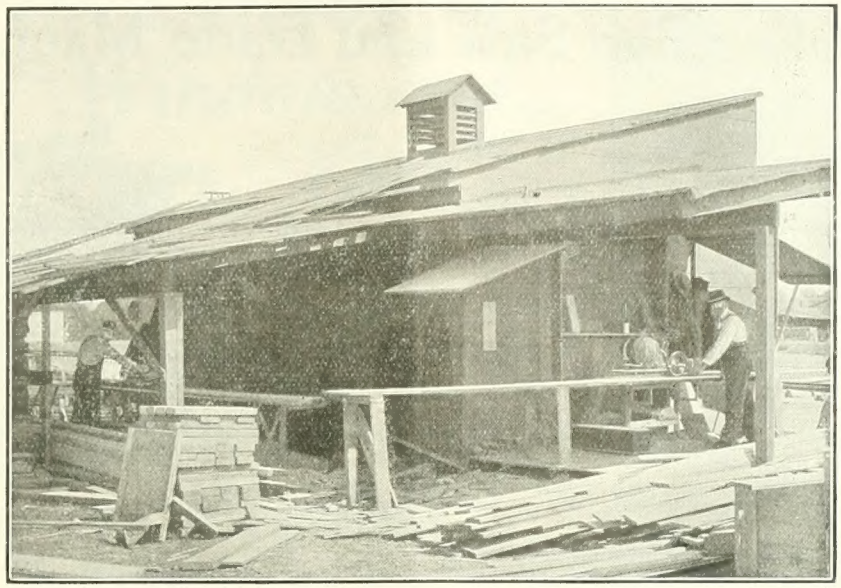


Elliot Boring Machine

Send for our New Catalogue with prices and terms

The Elliot Woodworker, Limited

Toronto - Canada



"RIGHT ON THE JOB"

The Elliot Woodworker at Work

The above illustration shows two Elliot Woodworkers in operation at the Canadian Kodak Company's new factory, Weston, Ontario.

C. E. Deakin, Ltd., Montreal, are the contractors and they have been using the Elliot Woodworker in that city for some time.

As proof of their satisfaction, when the Canadian Kodak building was started they immediately ordered two more Elliot Woodworkers to be put on the job.

These machines are cutting all the lumber and planks for their concrete forms as well as wedges and other work required, and they are saving from ten to fifteen men's work.

The machines are running all day long at a power cost of $1.25 to $1.50 a month.

The Elliot Woodworker has saved many Builders $150.00 a month. It will do the same for you

Just out—The New Elliot Catalogue, sent free on request

The Elliot Woodworker, Limited

College and Bathurst Streets **Toronto, Can.**

Fig. 6225. American Nos. 11 and 12 Combination Saw and Dado Machines

This machine is intended for ripping, sawing to any angle up to 45 degrees, plowing, grooving, dadoing, squaring up, etc. Capacity: The saw travels 15 inches and cuts to 4 inches thick.

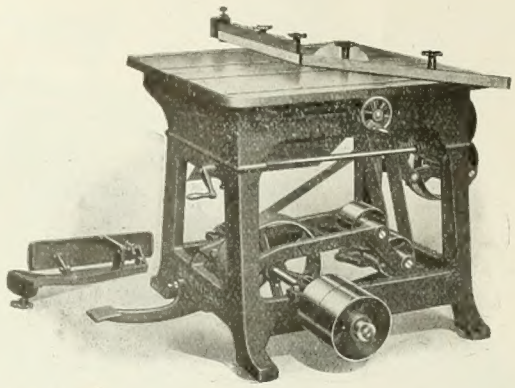
The Arbor is made of steel and runs in babbitted boxes in a strongly yoked carriage, fitted with rollers that travel on ways, thereby reducing the friction. The ways are fitted to the main frame of the machine and are raised and lowered by worm and worm wheel, operated by crank shown at front of machine.

The Table is of iron, 3 ft. x 3 ft. 3 in., laid out for cutting any angle desired up to 45 degrees. The hand wheels adjust the sliding tops apart for using dado head, changing saws, etc.

A Friction Device is provided for bringing the carriage forward and is operated by pressing the foot treadle 1-16 in., which connects the power. Rate of feed can be varied from 5 to 100 feet per minute.

The No. 12 is similar to the No. 11 except that the friction device is omitted and the travel of the saw carriage is controlled by a foot treadle.

Expanding Dado Head is 8 in. diameter, and is furnished with five sets of cutters, from 5-16 in. to 1¾ in. wide. Cuts ¾ in. deep.



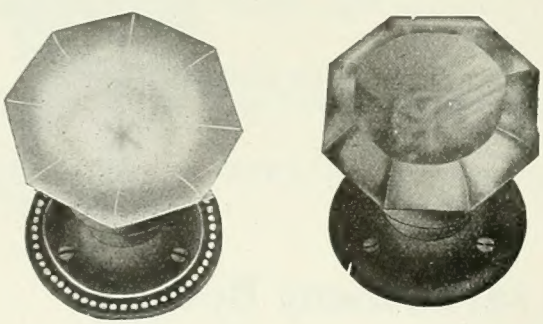
We furnish with each machine: one endless driving belt, one 12 in. diameter saw, with 1⅛ in. hole, and gauge as shown.

Countershaft has T. & L. (self-oiling loose) pulleys, 8 in. x 4 in.; speed, 900 revolutions per minute.

The Stuart Machinery Company, Limited

764 Main Street - Winnipeg

A Few of Our Line of Glass Knobs



We Manufacture an extensive line of Glass Knobs, also all kinds of High-class Builders' Hardware.

Goods Guaranteed — Prices Right.

THE
Belleville Hardware & Lock Mfg.
COMPANY, LIMITED

BELLEVILLE :: CANADA

Hardwood Flooring and Hardwood Interior Finish

"WILSON BROS. LIMITED" on flooring means a carefully kiln-dried and well manufactured article. Our flooring is straightened, hollow-backed, bored, end-matched, steel polished and bundled.

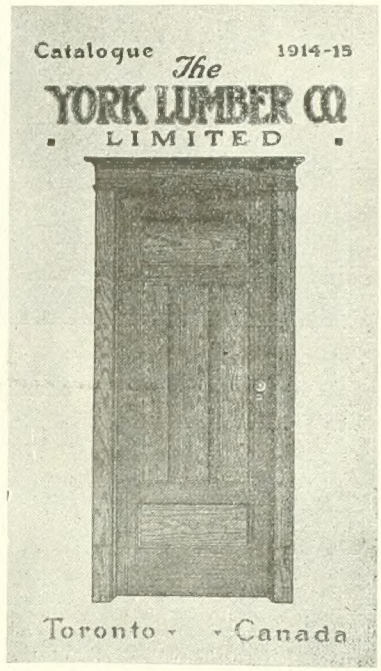
We specialize in Veneered Doors to detail, also all kinds of Hardwood Interior Finish.

Write and send list and details for Quotations

Wilson Bros. Limited

Collingwood, Ontario

Our New Catalog of "York" Window and Door Frames, "York" Trim Cut to Length and "York" Doors Semi-Hardwood Fir, mailed on Request.



Builders Attention!

"York" Trim cut to length

We can furnish **MANTEL HEADS**, casings, base-blocks, inside door frames, window stools, etc., for your private or apartment house. This trim is sandpapered and is ready to nail in place. This original and progressive idea is our own, and is manufactured exclusively by us. It is the greatest saver of material and labor ever offered.

"York" Frames $2.35 and up including Sash and Ball-bearing pulleys.

We carry in stock several hundred of the different sizes of window and door frames. These frames are made in a separate factory, which is a separate unit in our business. They are shipped in the knockdown—ready to nail together. We also carry stock sash for these frames ready for immediate shipment.

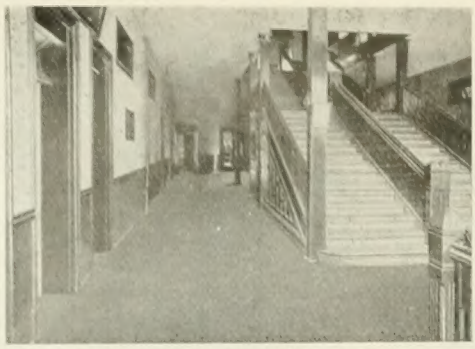
"York" Doors No 1. Quality $1.90 and up.

We have a large stock of these doors on hand, and can ship immediately. Five panels, same as shown in cut above. They are made of edge grain fir, rails and stiles, and Georgia Pine panels, which make a contrast like a picture in a frame.

Watch for our bargains in discontinued lines of doors in next issue

The York Lumber Company, Limited

Head Office: 1000 Gerrard St., East Toronto **Brick Plant, Dawes Road**



J-M Mastic Flooring For Public Buildings

has no equal for schools, hospitals, museums, office buildings, hotels, and other types of public buildings.

It perfectly withstands the heaviest kind of traffic. And although extremely dense and tough, it is also quite resilient to the tread. As a result, it is practically noiseless and easy on the feet.

J-M Mastic Flooring is absolutely sanitary. Does not originate or hold dust. Does not absorb grease, oil or filth. Unaffected by acids and, being waterproof, it can be easily and quickly cleaned by the simple process of flushing.

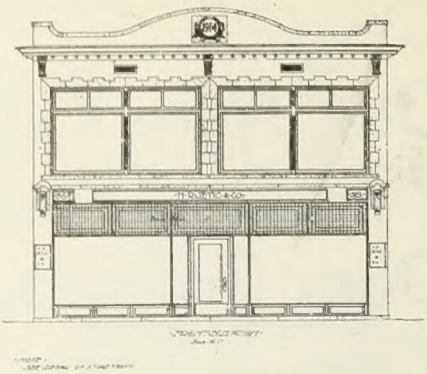
Whenever you have a flooring problem to solve for any kind of building, get in touch with our Waterproofing Department. Without obligation on your part, our experts will gladly co-operate with you.

Write nearest branch for interesting booklet.

The Canadian
H. W. Johns-Manville Co., Ltd.

Toronto Montreal Winnipeg Vancouver

2236



ETERNAL WOOD AND ETERNAL METAL

are the construction of the Petz Metal Covered Store Front.

This means durability, and in addition to durability—strength. The wood core stiffens the metal, and in long lengths we add a steel backbone.

Weather tests that we didn't expect have proven to the satisfaction of store owners that the PETZ store front can stand up to almost anything short of a hurricane.

Plate glass insurance companies indorse this statement by insuring plate glass held in PETZ fronts at the lowest rate.

Catalog and blue print of details on request.

DETROIT SHOW CASE CO.
494 West Fort St. - Detroit, Mich., U.S.A.

This building is equipped with Athey Weather Strip.

ATHEY
Cloth Lined
Metal Weather STRIP

NO weather strip on the market can compare with "ATHEY" for all round excellence. The following are a few of its many outstanding features:

- ¶ Keeps out all draughts and dirt.
- ¶ Absolutely dust proof.
- ¶ Prevents sash from rattling.
- ¶ The only weather strip with a cloth-lined channel in the sash.
- ¶ Effects a considersble saving in coal bills.

Write for particulars, prices, etc.

The Eberhard-Wood Mfg. Co.
Ornamental and General Iron Works
36-38 Lombard St. - - TORONTO

FOR SUPERIOR QUALITY AND PROMPT SERVICE **DISSTON**

Superfine Files Hack Saw Blades Hack Saw Frames

The universal recognition of the superiority of Disston Superfine Files has resulted in a steadily increasing demand throughout the United States and Canada for files of our manufacture. We make a large variety, furnishing shapes and cuts suitable for every kind of work for which Superfine Files are used.

We make our own steel, enabling us to control at all times the uniformity of its high quality. This results in a combination of efficiency and durability that cannot be equalled by any other file than a Disston. Send for price list.

Hack Saw Blades

The Disston "Chromol" blades, for both hand and machine use, are hard and tough without being brittle. The teeth are milled in and set in such a manner that every third tooth is straight—acting as a cleaner. "Chromol" steel is peculiarly suited for metal-cutting blades, and we guarantee these blades to be more satisfactory than any other blades on the market.

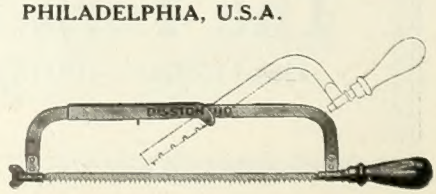
Hack Saw Frames

made after the Disston Patterns and from Disston Materials are the most efficient and durable that can be obtained. Complete catalog, or separate descriptive leaflets on request. The frames shown below are two of the most popular patterns, but we make a large line, embracing a wide number of patterns.

We are prepared to give prompt service on shipments.

HENRY DISSTON & SONS, Inc.
PHILADELPHIA, U.S.A.

Reg.U.S.Pat.Off.



B.B.L. HIGH GRADE PLANING MILL PRODUCTS

We will shortly have ready our new and up-to-date

Moulding and Sash Catalog

It will contain full size illustrations of all our mouldings. A great variety of new and desirable effects are included, many of which are shown for the first time.

OUR PLANT IS ESPECIALLY EQUIPPED TO MANUFACTURE

HIGHEST GRADE GOODS AT THE LOWEST COST

Send in your bills of **Mouldings** and **Trim** and we will give you figures consistent with the grade you require. Our delivery of this class of goods is immediate.

BENSON & BRAY, Limited

Midland, Ontario

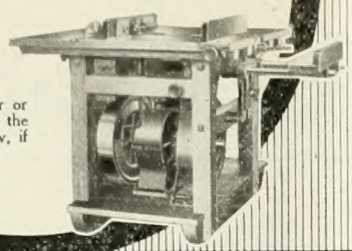
Some Facts You Should Know

OSHKOSH

We should like to send you a number of interesting—and exceedingly **stubborn**--facts about the Quality, Performance and Popularity of

OSHKOSH EVEREADY
Portable Saw Rigs

These facts are valuable to Contractors who want to save--*and make*--more money. We have put them in book form and will be glad to send them to you--Free --for your name and address. It will pay you to send for the Oshkosh Book. A letter or postal will do; or use the Coupon below, if you prefer.



This Coupon Brings the Facts

OSHKOSH MFG. CO., 520 S. Main St., Oshkosh, Wis.
Please send free—without obligation to me—The Oshkosh Book of Facts.
Name .....
Address .....

GLASS

All Kinds of Glass for Building Purposes

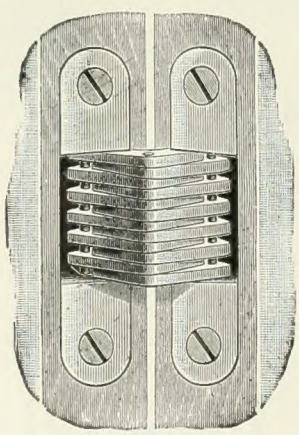
Plate, Window, Figured
Ornamental
Bent and Mirror Glass

The Consolidated Plate Glass Co.
of Canada, Limited

TORONTO MONTREAL WINNIPEG

Soss Invisible Hinge

For use on Panel Work, Lockers Closets, Counter Flaps, Partition Doors, Cabinets, etc.



Soss Invisible Hinges are made in a variety of sizes, the largest being adapted for largest size door.

Send for circular and prices; or buy from leading Hardware Dealers

SOSS INVISIBLE HINGE CO., LIMITED
104 Bathurst St., TORONTO

New Ventilation System

THIS ventilator will provide a perfect ventilation in any room where it is installed, no matter how large it is, without by any means affecting the temperature. Its operation is so simple that a child can operate it.

The invention has already been submitted to experts in hygiene, and has been approved and highly recommended for public institutions, schools, hospitals and private houses.

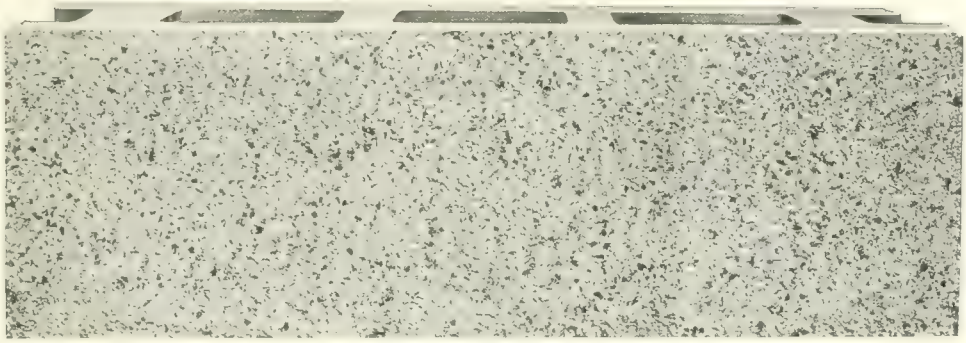
A letter or postal will bring you full particulars

Joseph P. Marois
921 St. Andre St. - Montreal

MOLDS FOR CASTING

Water Proof Hollow Cement Building Blocks

With Granite Faces



8 x 8 x 24 inch Granite Smooth Faced Block

They cost less

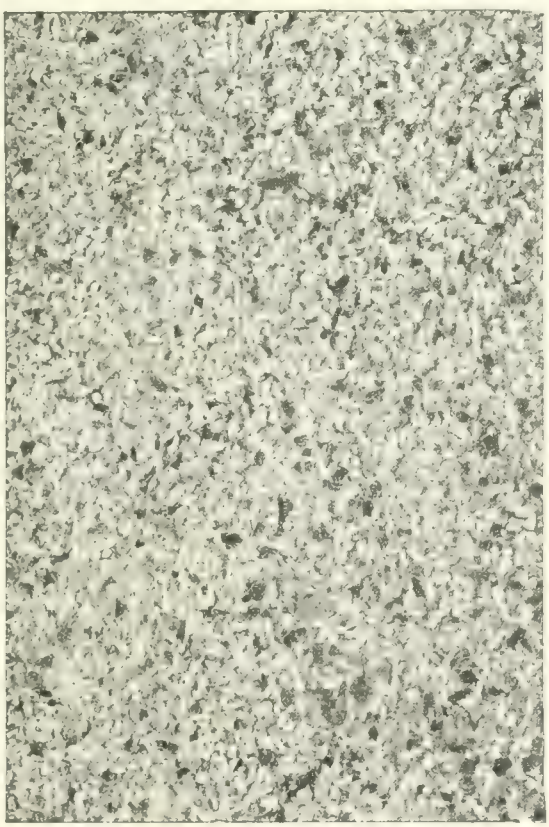
They sell for more

You sell more of them

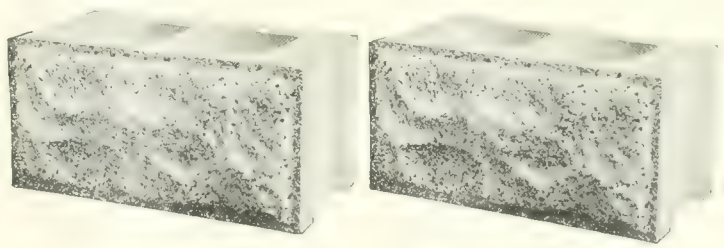
By a new process, which protects the facing, while the block is being cast, we eliminate all traces of cement from the face of block, and nothing but the GENUINE GRANITE SHOWS IN ALL ITS SPARKLING BEAUTY.

These cuts show blocks just as they came from the molds; they are not treated with acid or scrubbed with brush, or sprayed.

We challenge the whole world to show us a cement block made by any other system, at any cost, that equals these blocks for beauty, strength, quality or imperviousness to heat, cold, or moisture.



Enlarged View of Granite Smooth Facing



8 x 8 x 16 inch Granite Rock Faced Block

Send us fifty cents and we will send, freight prepaid, to any point in Canada, one of our granite-faced blocks. YOU WILL SAY WHEN YOU GET IT THAT YOU NEVER SAW A CEMENT BLOCK BEFORE.

They are positively cheaper to make than the ordinary dry-tamp, sand-faced block.

MR. BLOCK MAKER:—

What show will you have if your competitor secures the exclusive right for this system in your city?

MR. CONTRACTOR:—

Get into a business that is protected. Then you will make money.

Send for catalog fully describing our system and showing our multiple molds mounted on trucks, for casting hollow cement building blocks.

Canadian Zagelmeyer Co., Limited

302 Howard Ave., Windsor, Ontario

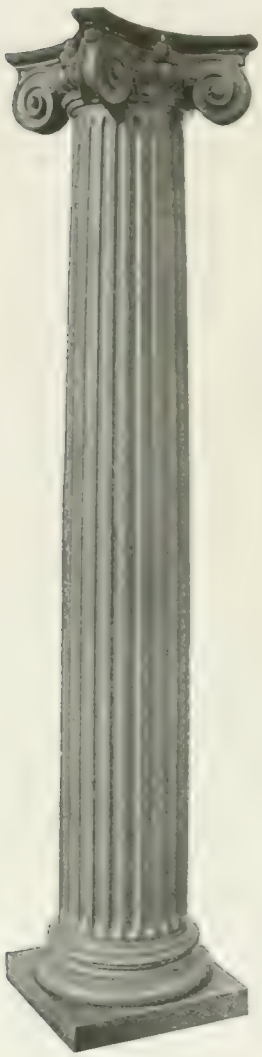
The Most Modern and Best Equipped Sash, Door and Column Factory in Canada

WEST BATTS LIMITED TORONTO

BATTS' STAVED COLUMNS

Our Columns are made with a special Lock Joint which prevents the staves from opening, and also increases the glueing surface. We use the best water-proof glue obtainable.

In connecting the cap and base to the shaft of our columns, both ends are bedded in Mastic Putty. By this method, water or moisture is prevented from getting to the inside.

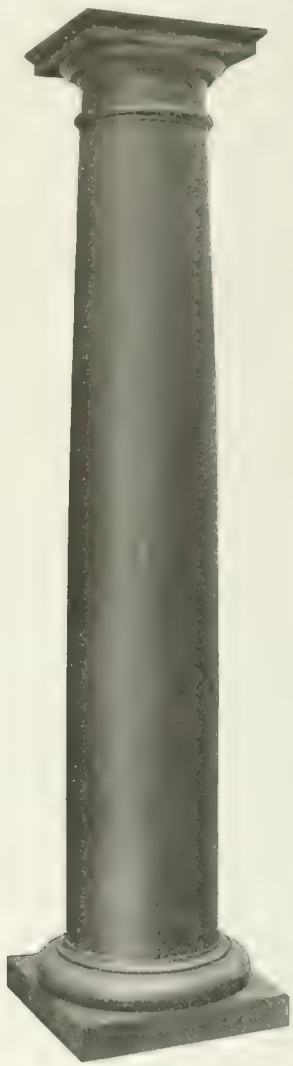


Design B. L. No. 5

Length	Diameter— 5 in.	6 in.	8 in.	10 in.	12 in.
4 ft. Price	$3.10	$3.35	$4.20	$6.10	$9.00
5 ft. Price	3.40	3.70	4.40	6.80	9.55
6 ft. Price	3.70	3.95	4.55	7.20	9.85
8 ft. Price	..	..	5.30	9.10	10.95
9 ft. Price	..	..	5.75	9.65	11.75
10 ft. Price	..	..	6.10	10.00	12.30

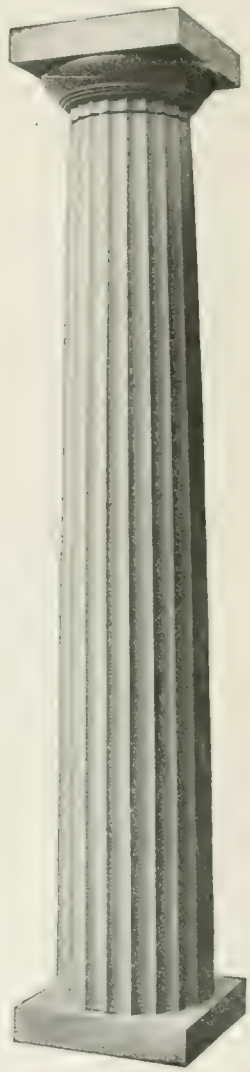
Design B. L. No. 4

Length	Diameter 5 in.	6 in.	8 in.	10 in.	12 in.
4 ft. Price	$2.60	$2.80	$3.70	$4.75	$8.00
5 ft. Price	2.85	3.10	3.85	5.00	8.50
6 ft. Price	3.10	3.30	3.95	5.15	8.75
8 ft. Price	..	..	4.55	5.95	9.75
9 ft. Price	..	..	4.95	6.50	10.50
10 ft. Price	..	..	5.20	6.75	11.00



Design B. L. No. 1

Length	Diameter— 5 in.	6 in.	8 in.	10 in.	12 in.
4 ft. Price	$1.60	$1.70	$2.25	$3.00	$5.00
5 ft. Price	1.85	2.00	2.40	3.25	5.50
6 ft. Price	2.10	2.20	2.50	3.40	5.75
8 ft. Price	..	..	3.10	4.20	6.75
9 ft. Price	..	..	3.50	4.75	7.50
10 ft. Price	..	..	3.75	5.00	8.00



Design B. L. No. 6

Length	Diameter 10 in.	12 in.	14 in.
6 ft. Price	$6.80	$8.85	$10.60
8 ft. Price	8.70	9.95	11.95
9 ft. Price	9.25	10.75	12.90
10 ft. Price	9.60	11.30	13.55

Builders allowed 10% discount on 8, 10 and 12-inch columns, B.L. No. 1, 2, and 3, designs.

Write for our Catalogue and Particulars

385-387 Pacific Ave. **BATTS LIMITED** West Toronto

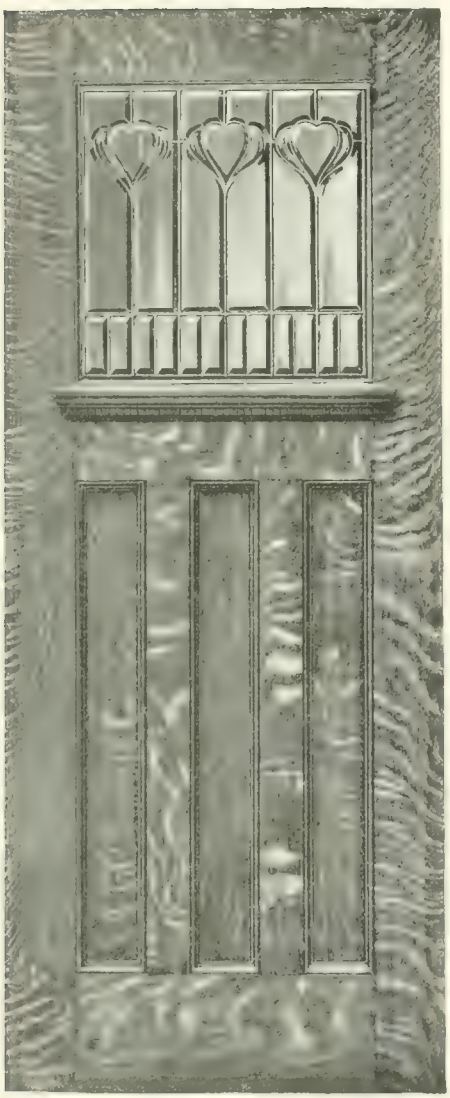
The Highest grade goods at reasonable prices, with prompt delivery

The Most Modern and Best Equipped Sash, Door and Column Factory in Canada

WEST
BATTS LIMITED
TORONTO

Batts' Doors are Reliable Doors

We carry a large stock of Doors of all kinds ready for immediate delivery. Write for our Illustrated Catalogue.



B. L. No. 314, ¼ Cut Oak

Sizes in Stock	¼ Cut Oak	Pine
2 ft. 8 in. x 6 ft. 8 in. 1¾ in	Price $8.50	$4.00
2 ft. 10 in. x 6 ft. 10 in. 1¾ in	Price 8.50	4.25
3 ft. 0 in. x 7 ft. 0 in.—1¾ in.....	Price 9.00	4.50

B. L. No. 304, ¼ Cut Oak

Sizes in Stock	¼ Cut Oak	Pine
2 ft. 8 in. x 6 ft. 8 in.—1¾ in	Price $6.25	$3.25
2 ft. 10 in. x 6 ft. 10 in. 1¾ in	Price 6.25	3.25
3 ft. 0 in. x 7 ft. 0 in. 1¾ in	Price 6.50	3.50

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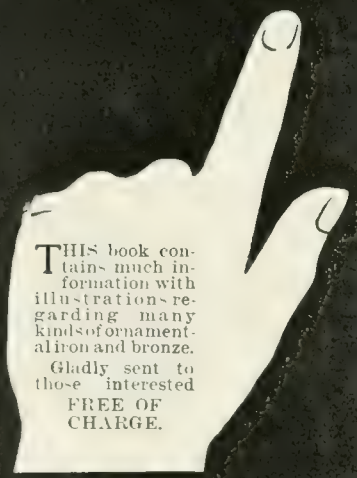

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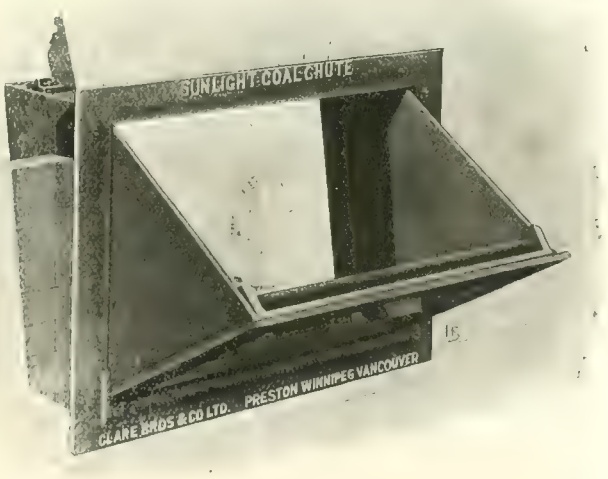

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The Canadian Builder and Carpenter

PUBLISHED END OF FIRST WEEK

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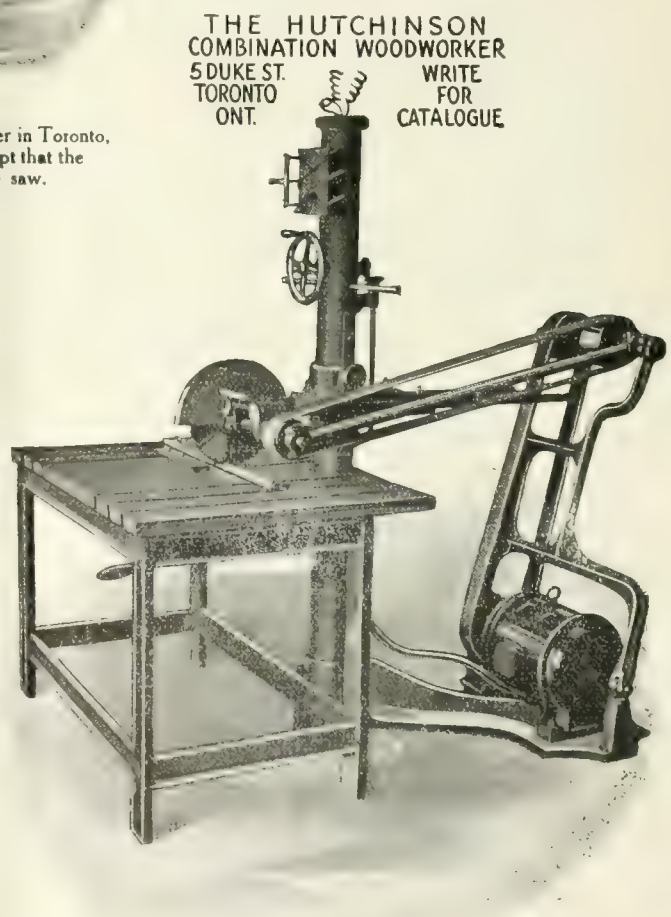

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Advantages of the Quantity System for Estimating Bidding Prices for Building Construction

BY
G. ALEXANDER WRIGHT

THE ever increasing amount of unproductive time, and usually money, which contractors are called upon to expend in preparing gratuitously, quantities, as well as prices, often for an owner's benefit, suggests that the time has arrived when all concerned should take up, and seriously consider, the possibility of adopting a modern and more sensible system of estimating, such, for example, as has been long in successful operation in older communities. When bidders are invited to submit bids, they are theoretically asked, of course, to submit competitive prices, but in actual practice their bids are based upon competitive quantities, before the competition in prices commences; which, in my opinion, is as unjust to the contractor as it is ridiculous. A building can only contain a certain amount of material, and no amount of figuring by contractors against each other can make that quantity any more or any less. Where, then, is the sense in a dozen or more general contractors competing against each other in taking quantities?

Legitimate competition can only come in where one man can handle a job better than another, or one man may have some advantage over another in buying, and so forth. No amount of figuring can reduce the real quantity of material which a building will take, and so it would be proper and fair to start all bidders figuring upon the same basis, by furnishing each with a schedule, or bill of quantities, showing accurately and clearly the different quantities and kinds of materials which the bidder is invited to figure upon; and even then there would be plenty of competition left, in placing profitable prices against each item.

No new or untried principle is involved. It is simply that of a definite quantity of work for a definite amount of money. It may be stated that the Quantity System is equally applicable to engineering works, such as railroad work, sewerage disposal schemes, canals, pumping stations, etc.

Let us consider, for a moment, a few of the disadvantages of existing methods:

The time usually given for figuring is far too short for the accurate taking off of quantities, in addition to the pricing and figuring out of the many items.

Again, the careful bidder who honestly tries to get in all the items, and figures to do the work as called for, is frequently beaten by a less competent bidder, who forgets something, or who maybe, is willing to take a chance anyway, in order to get the job.

The great difference we find in bids arises, in my opinion, not so much in the prices or money values placed against the quantities, as it does from errors in the quantities themselves, the accurate preparation of which calls for special training and continuous concentration of mind, which the busy contractor of to-day can seldom find time to acquire.

Bill of Quantities.

Now we will investigate a bill of quantities, such as we are considering. What is it, and how is it used?

First of all, it is a document, handed free of expense to each bidder, lithographed or similarly duplicated, in order that all bidders' copies may be exactly alike. It will contain everything which it is essential for a contractor to know when making up a figure, with a separate section for each trade, such as excavation, concrete, brickwork, and so forth. A general summary is provided at the end of the bill, in which is entered the net cost of each trade; this summary is footed up, the profit the bidder expects to make is added, plus the cost of the quantities, the result being of course, the amount of the bid.

The methods of measurement must conform to the standards used by each individual trade, and through the bill the greatest care is taken to have everything systematized; all cubic, square and lineal feet, and numbers of items, will be found altogether under their respective heads. In this way, immediate reference may be made to any item required even though the entire bill may contain hundreds of items, and so every item has its proper place—nothing is left to chance. Detail sketches also appear in the margins whenever necessary, to show a bidder at a glance what is required. These, as we know, are of more value to an estimator than the long written descriptions one sometimes finds in specifications. The keynote of the Quantity Surveyor is accuracy. In going through the drawings and specifications he has come across all those doubtful questions which always crop up when figuring under present methods. He will have taken them all up with the architect, and adjusted them, before the quantities are handed to bidders, so that everything is all plain sailing

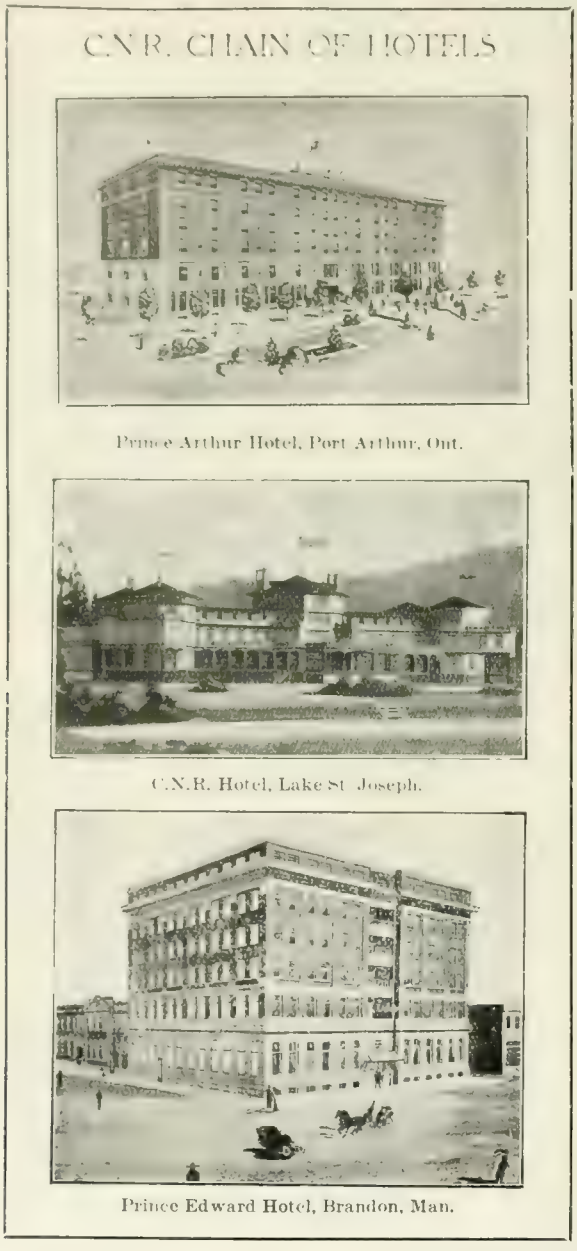
Every Part of the Work Is Scrutinized.

Nothing is "near enough" for a Quantity Surveyor—he scrutinizes every part of the work closely, clears up any doubts, or anything capable of a double interpretation, and his work leaves no loopholes for either the owner, the contractor or the architect to take advantage of. The result is that it is seldom necessary for a bidder to ask questions of the architect when making up a figure. If he should wish to do so probably he would be referred to the surveyor, who is familiar with every minute detail of the work.

Further, and right here lies one of the greatest advantages of the Quantity System. It is not necessary, except in a general way, for a bidder to study the drawings and specifications at all, and he certainly does not have to figure them. He simply prices the bill of quantities, and, in these days of hurry and bustle, this is as much as a contractor can be expected to do for nothing. This enables the competent contractor (the one who has unit prices at his finger ends) to make up a bid for, say, a $100,000 building, in a few hours, and he has the satisfaction of knowing when the unit price is placed against each item, that nothing has been forgotten; in other words, he only contracts to furnish so much material and labor—and surely this is absolutely right in principle. Good reasons exist why the general contractor should have faith in his own judgment and accustom himself to price items in every trade which goes to make up the building business. It is the only consistent method of estimating, for anyone who claims to be a general contractor. Experience has

*Read before the Pacific Coast Association of Engineers and Architects.

taught most competent ment that it pays to do it. The mere getting together of figures from sub bidders, and footing up the totals of the lowest, is not estimating at all. That is merely schoolboy work. However, I am led to believe that this is now the exception among general contractors in San Francisco rather than the rule. The ideal contractor is the one who makes up his own estimates, and not he who is dependent, for any reason, upon sub-contractors, who thus become the real estimators. If every general contractor would keep a prime-cost book of all trades, and quantities were supplied to him, he would soon be in a position to give a fairly close figure upon any sized structure, without first taking sub bids, and this I suggest is the



Prince Arthur Hotel, Port Arthur, Ont.

C.N.R. Hotel, Lake St. Joseph.

Prince Edward Hotel, Brandon, Man.

most consistent, satisfactory and profitable method to pursue, when bidding upon work as a whole; but of course it requires care and experience.

Further, one of the greatest arguments in favor of letting contracts as a whole is, of course, the fact that a general contractor has the ability to figure all trades in his own office, and that he knows how to, and will supervise the work of sub-contractors, if any. If architects can be assured of this being done, it would be better for all concerned.

In general practice I believe the accuracy of the bill of quantities should be guaranteed. Such a document might well be made the basis of the contract, equally with the drawings and specifications; if this were done, the chief cause of disputes between owner and contractor would be removed.

This, I submit, is entirely logical, and right—a certain quantity of work for a certain sum of money, the owner to determine the former and the contractor to fix the latter. Surely this is morally just and fair.

It may be asked, Where are these competent surveyors to be found? And it would be a natural enquiry, as it is not part of the duty of architects to prepare such quantities. In fact, the relation of the architect to the contractor should preclude him from having anything to do with furnishing quantities. This should be attended to by a disinterested specialist—the quantity surveyor.

He must do what is right in measuring, as between the contractor and the owner. The usual custom is for the architect to furnish the quantity surveyor with a set of the drawings and a draft specification, and the latter then commences work in his own offices. During this period the architect and surveyor are in frequent consultation, to the end that all uncertainties are cleared up and adjusted upon the drawings and specifications. In short, no effort is spared to obtain perfect clearness and accuracy before bidders commence figuring.

Three Different Processes.

Three distinct processes are involved, and each process calls for different operations.

First—"Taking Off" and entering every item (or "dimension," as it is called) upon the dimension sheets. This is always done in exactly the same order, in every building; no dimension, however small, is omitted—no guess work of any kind is permitted. The exact location in the building of every dimension taken is carefully noted, and every figure or note taken is carefully preserved for future reference.

Surveyors' quantities are usually measured net, and it is so stated in the preamble of the bill—upon the understanding that the unit price for each item is to be made, by the contractor, to cover trade customs, etc., which differ in each locality.

Second—The before-mentioned dimension sheets are usually checked over with the drawings by a second person, and then all totals are abstracted; that is to say, they are transferred to abstract sheets, under separate headings. In this way many similar items of the same value are collected together and footed up and checked.

Third—This reduces the number of items which appear eventually in the finished bill, which is written direct from those abstract sheets, and any further sketches or descriptions necessary for the bidder to thoroughly understand what is required are then finally added. When completed, a sufficient number of copies of these bills are lithographed, or otherwise duplicated, and a copy is sent by the surveyor to the list of prospective bidders, whose names and addresses have been previously furnished him by the architect.

Advantages of the Quantity System.

Some of the advantages of the Quantity System of estimating to the contractor are as follows:

(1) Saving of time and money.

(2) Greater precision in measuring

(3) No uncertainty as to interpretation of plans or specifications (the quantities should govern).

(4) No visits to the architect's office when figuring, for explanations or otherwise.

(5) No other work is contracted for except the quantity set forth in the quantities.

(6) The contractor, if he so desires, can check up the quantities before signing a contract. In an American system of estimating the quantities should, I think, form part of the contract.

(7) No bidder can inadvertently leave out anything, and so in this way arrive at too low a figure.

(8) Not having to spend time taking out his quantities, the contractor has time to attend to more profitable business

(9) Systematically arranged bills of quantities duly priced (whether work has been secured or not) form excellent data for making future estimates.

Before an American system can be put into operation it will be necessary:

First—That a committee of representative contractors be selected to standardize a method of measurement to be universally followed by all contractors and architects.

Second—That competent men, mutually satisfactory to contractors and architects, be retained in such numbers as the volume of work may demand. These men, or quantity surveyors, could be placed under bond, covering their competency and integrity until they have been proved and assured; such appointments to be permanent, except for good cause; the compensation of these surveyors to be fixed at a certain percentage upon the total of each estimate; each bidder, of course, adding this amount to his bid.

Third—I suggest, also, that a law be passed requiring that a bill of quantities be furnished (free of expense to bidders) upon all public buildings. I advocated this as far back as the year 1893, and it may interest you to know that such a law is actually in 1895. It does not, however, go quite far enough, as the quantities furnished have no guarantee as to their accuracy. Quantity question is attracting much attention at the present moment among contractors in Boston, New York and other cities, and I may mention, perhaps, that a program is now being formulated to bring this Quantity System question to the attention of every building contractors' association and every architects' society in this country.

Fourth—In connection with the Quantity System I still advocate the creation of a technical tribunal, or court of arbitration, where nothing but building suits and disputes shall be determined and adjusted. Such court is to be presided over by a specially selected judge and at least two other persons of practical experience in the actual construction of buildings, and in estimating the value of builders' work, and familiar with building trade methods, terms, processes and customs.

Mistake in Builder's Name

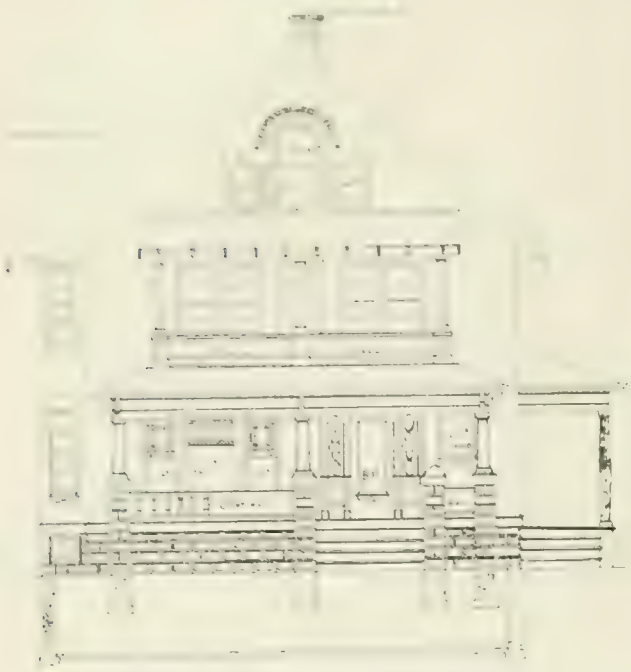
In the August number of the Canadian Builder and Carpenter in an article under the heading of "Use of Wood Trimmer in Building Construction," reference was made to a house as being built by Mr. D. Burnham. This was an error, as the house in question is being built by Mr. Fred. Markham.

What is waste? If a piece of lumber is worth more for fuel than for any other purpose, and is burned, is it waste?

Model Bathroom. (Courtesy of the Standard Sanitary Mfg. Co., Toronto.)

Plans and Description of Frame and Brick Veneer Dwelling in Welland, Ont.

Herewith are shown elevations and floor plans of a frame house, brick-veneered. This class of dwelling finds favor in localities where there is no by-law against putting up buildings of this nature. The appearance is excellent, and, from the outside, it is a hard matter to tell that a brick-veneer house is not a solid brick one. This is particularly true of the one erected from the accompanying plans. The brick used is a dark red, and contrasts nicely with the large white mortar joint.



Front elevation.

Large Number of Windows.

One of the features of this house is the large number of windows throughout. A glance at the elevations will show this. In the hall, the door contains a large sheet of beveled plate glass, there are lights of leaded glass at each side of the door, and a good-sized leaded glass window set midway between the door and the east wall. The parlor has three windows with the tops in leaded glass of neat design. The plan shows the large bay window in the dining room.

Upstairs, the whole front of the house is taken up by one bedroom, and this room is lighted by four lights of uniform size; the bedroom at the side has three, and so has the back room.

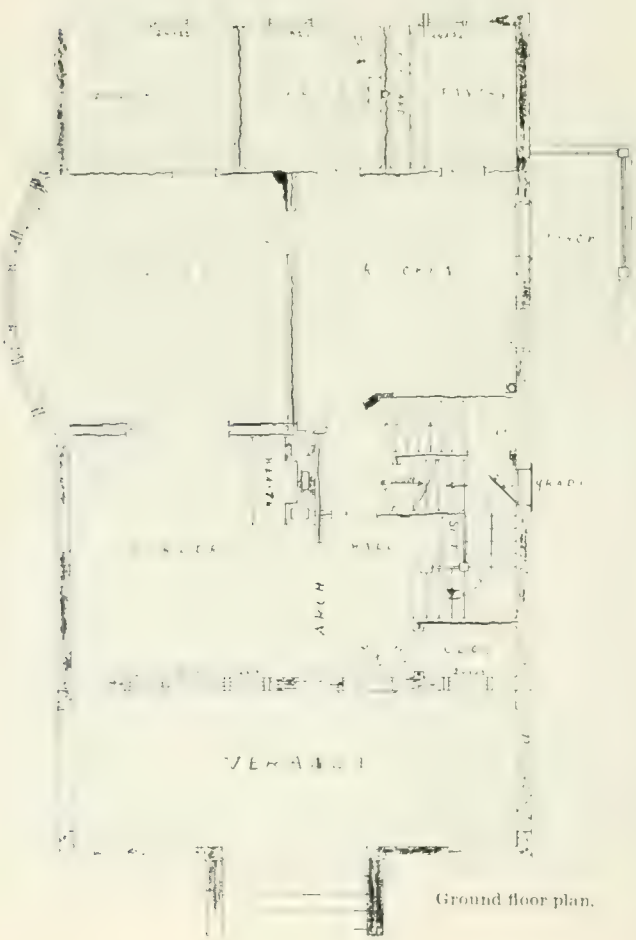
The sleeping porch and sunroom shown in the rear is completely encased in glass. The front room in the attic has three.

Size of the Rooms.

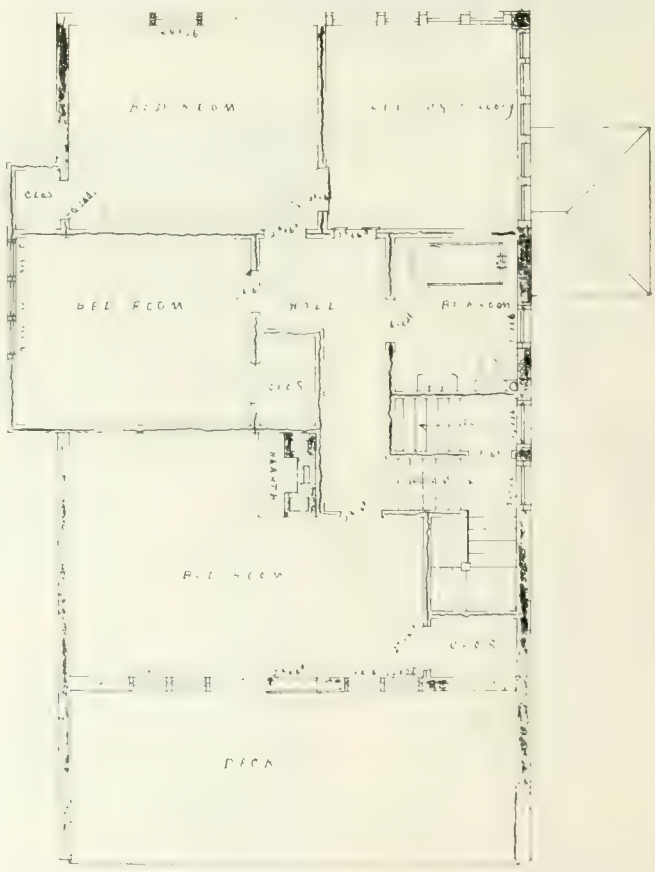
All the rooms are of good size and well arranged. The verandah is 25 ft. x 9 ft.; parlor, 14 ft. 6 in. x 14 ft.; dining room, 16 ft. x 15 ft.; kitchen, 13 ft. x 13 ft.; pantry, 5 ft. 3 in. x 8 ft. 6 in.; bathroom, 8 ft. x 8 ft. 6 in.; maid's bedroom, 10 ft. x 8 ft. 6 in.; front bedroom, 14 ft. x 21 ft.; middle bedroom, 10 ft. 6 in. x 14 ft.; rear bedroom, 15 ft. x 12 ft.; sleeping porch, 12 ft. x 12 ft.; bathroom, 7 ft. x 9 ft. 6 in.

Slight Alteration in Ground Floor Plan.

While the ground floor plan shows a room marked



Ground floor plan.



First floor plan.

"bathroom," this room contains only water closet and lavatory, the bath having been left out.

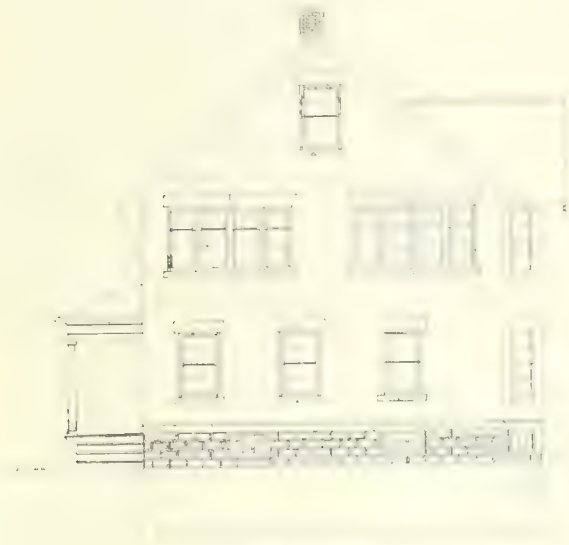
Hardwood Floors and Black Oak Trim.

Double hardwood floors have been laid on both the ground and first floors, and the trim throughout is in black ash. The front bedroom is enameled in white.

The heating system is a hot water one, and the house is equipped for both gas and electric light.

Verandah on Ground and First Floors.

The verandah is the full width of the house, and is supported on brick piers and round, tapering columns.



Rear elevation.

There is also a verandah off the front bedroom and a large porch on the east side.

Garage in Rear.

In the rear of the house is a garage 20 x 24 ft., built of concrete blocks. The house is built on a concrete foundation and on a lot 31 ft. frontage.

S. L. Lambert, Welland, Ont., owns this house, and it was built by C. Hoph, also of Welland.

Framing a Conical Roof

In framing a conical roof, the length of the hip rafter is shown at A-B of Fig. 1, the plumb cut at 1 and the foot cut at 2 then cut in the purlins between the hip rafters, the length of purlin being shown at C-D of Fig. 1 and at C'-D' of Fig. 2. The cut against the hip rafter is shown at 3 of Fig. 1. This is a 45 degree cut, the purlins being set with the sides plumb.

Next cut in the common rafters against the purlins, the length being shown at C'-E' of Fig. 2 and the plumb and foot cuts at 4 and 5. Next cut the jack rafters against the hip rafters, the cut against the hip rafter being shown at 6 of Fig. 1 and the length of Jack E-F in Fig. 1 is shown at E'-F' of Fig. 2. The plumb and foot cuts for the jacks are the same as for the common rafters.

Now sheath the hip roof up to the purlins which will give nailing support for the conical roof. In framing the roof set up four rafters with their centres on those of the hip rafters of the square roof. The length of these rafters is given at G-H of Fig. 1 and at G'-H' of Fig. 2. The plumb cut is given at 7 and 8, these cuts being the same. The foot cut is shown at 9. The foot cut should be grooved with a V groove corresponding to the backing for a hip rafter, which is shown at 10 in Fig. 1. The hip rafter should be cut a trifle longer on account of this groove.

The next step is to cut in segmental shaped purlins between these four rafters as shown by the shaded segment M; then set up four rafters with their centres on the rafters, N. O, P and Q. The length is shown at J-K and J'-K', while the plumb and foot cuts are shown at 8 and 11.

We now have eight rafters set in place forming the conical roof. If these are not sufficient, depending, of course, on the size of the roof, others may be added. The plumb cut will be the same as the first ones. The lengths are shown at R-S and T-U. The foot cut will

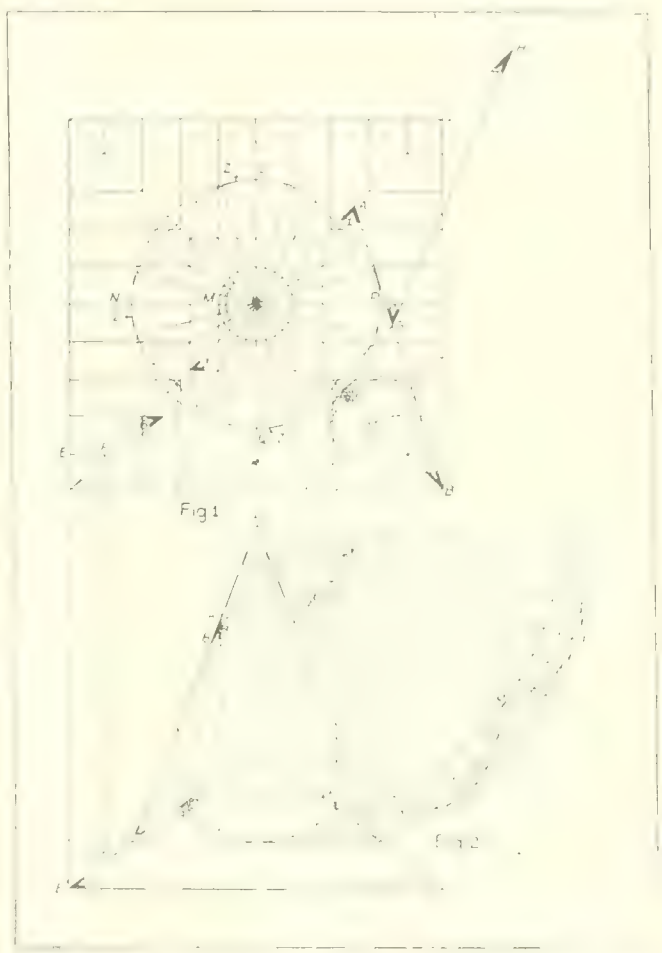


Fig 1

vary, but can be scribed on the sheathing, which should not be difficult, as the length is given. Other segmental purlins may be added to give better support for the covering.

The lines in the diagrams representing rafters indicate centre lines taken on the centre of the top edge of the rafters, those representing purlins indicate outside corner on top edge of purlins.

The solid line Z in both Figs. 1 and 2 represents the line of intersection of the conical with the hip roof.—E.H.B., in Building Age.

An Economical Builder's Saw Outfit

That the use of circular and cross-cut saws in reducing dimension lumber to needed sizes will enable a contractor to save from one-fifth to one-third the amount

of an ordinary lumber bill, has been proved by A. W. Anson, a contractor.

During the past few years Mr. Anson has completed contracts in various parts of the southwest, and on every job has used his table saws to good advantage. He has, perhaps, the most complete sawing outfits used by any contractor in the West to-day. There is an 8 to 16 in. circular saw, which is used for dadoing, plowing, and ripping, and it can even be used for tenon-making, if has an adjustable table, of course. The cross-cut saw is used for cutting down big dimension lumber. A small saw can be put in place of the large one at any time and used for fine cutting.

Both of the outfits are equipped with saws of various kinds and sizes. There is a separate pulley which drives a pony planer, sander, and emery wheel. The cross-cut saw is attached to a 5 h.-p. electric motor, and the circular is driven by a 7 h.-p. motor. These rigs were used in the construction of a large station, and at that time 6 in. logs were cut by the circular saw. On that job the saws were kept quite busy, yet the expense for electric energy was but little more than 25 cents per day.

The outfit can be taken up and moved most anywhere for less than $15. A man on the job re-wires the layout after each move. The motors are usually bolted to heavy plank platforms at each new job; the wires are fastened to the scaffolding.

On work such as store building repairing Mr. Anson is able to make a 20 per cent. saving on the price of lumber, by buying big dimension stuff and cutting it down to suit. Where there is much paneling to be done, as is the case where little bungalows with built-in features are to be erected, the saws will register a saving of at least 40 per cent. on the lumber bill.

An outfit of this kind is a great money-saver in the matter of mill work. The contractor can not only figure in the saving as profit on his bid for a job, but he can rush the work through. If his plans call for a novelty in the way of a window, the saws soon turn out the particular pieces of material needed. It proves its efficiency very quickly on a job where china closets, buffets, and fancy paneling are called for.

The expense of the equipment is insignificant as compared with what it earns for its owner each year. The cross-cut table saw only cost $75, while the circular saw cost $125. The motors were approximately $200 each, and the additional equipment probably cost $50. It is likely that $650 fully covers the investment, and the foreman, who has used the saws for years, claims that they have saved the cost on several different jobs. —Woodworker.

Crushed Brick for Concrete

Crushing brick for use in the making of concrete is not a new idea, but it seems to be lately gaining considerably in recognition and use. There has been going the rounds a story of the crushing of old brick in San Francisco that have been laying in piles since the clean-up after the earthquake and the using of great quantities of it in concrete work. A gyratory rock crusher is used, which it is said gives excellent results taking in the brick and mortar and reducing it to about 1½ in. in size and less. The brick is used in place of crushed rock or coarse gravel in the making of concrete.

Many old brick have been crushed to make material for the concrete base under new street paving. Sometimes the old brick are worn paving brick taken up from sidewalks and from streets, and at other times they are old building brick, and it seems that everywhere they are used they give splendid satisfaction.

There is, perhaps, room for further development of this idea than we have had so far, room not only to use up many of the old brick from buildings and streets, but also to use culls and bats from the kilns and old brick of all kinds which is no good to use again as it is. Of course, the harder the brick the better, and likewise the harder it is to crush, but any fairly well-burned brick seems to make a splendid coarse filler for concrete. In some localities not much attention may be paid to it, because coarse gravel is plentiful, but in some cities in which there is even an abundance of gravel it is found advantageous to crush old brick and use it. It is a splendid way to dispose of old brick, and the more of the old brick which might otherwise be put into walls that can be used in this way, the more room there will be for new brick in wall building. Incidentally, there should be many instances where the brick manufacturer himself will find it worth while to put in a crusher and reduce his culls and bats to material for concrete and market it in this form. It makes good concrete, and both the crushed brick and the finer particles of dust resulting from it make an excellent road metal.

Eberhard and Wood Employes Excursion and Picnic

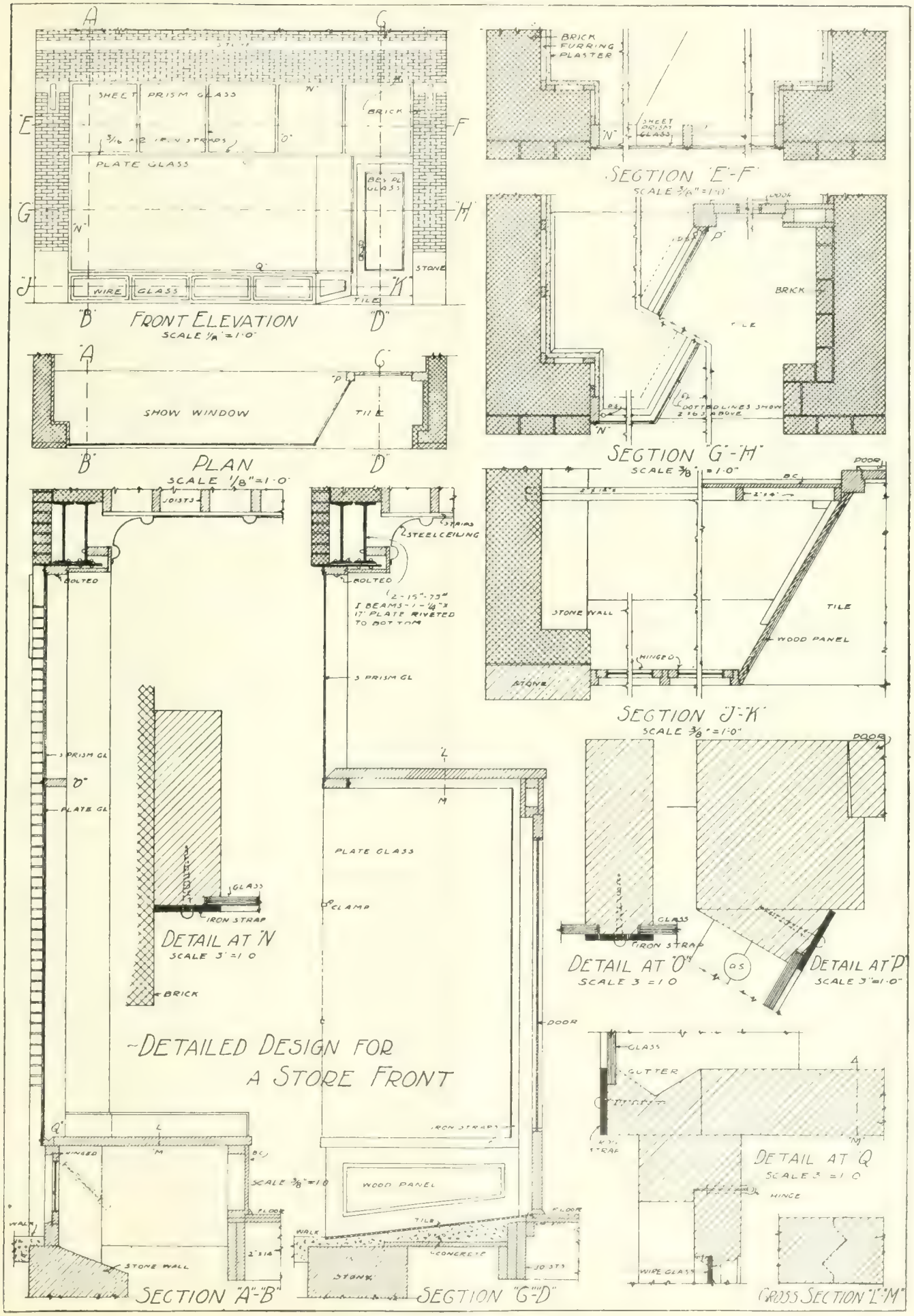
The employes of the Eberhard-Wood Mfg. Co., Toronto, with their friends, held their annual excursion and picnic at Grimsby Beach on Saturday, August 15. The party, numbering about one hundred, left on the 8.15 a.m. boat. Luncheon was served at the picnic grounds at 12.30 p.m. During the afternoon a long list of sports was gone through, including a football match and tug-of-war. At the close of the programme Mrs. Eberhard distributed the prizes. On the return journey a musical programme was arranged and thoroughly enjoyed by all the party. The weather was delightful, and the picnic most successful from every standpoint.

Finishing a Floor or Walk the Next Morning

When concrete floors are laid in cold, damp weather and in damp places, very often they have to be placed too wet, with the result that they do not set up sufficiently to make it possible to finish the same day as deposited.

When a floor is being laid in a damp place, it is a good plan to run the grouting the day before and then the top the next morning, being careful not to let the grout run with too strong a percentage of sand, brush in a little neat cement to give a better bond, and trowel the topping as it is applied.

Never try to shape partially set topping. In step and wall work which demands plastering, partially set plaster that seems heavy ought to be removed and newer plaster added; this seems to give me better results. Therefore, I suggest that in case of a wet floor a trowel or shovel be used, and from an ⅛ in. to ¼ in. of the finish course be removed, then enough fresh topping be troweled in to bring the floor to its former level. This fresh topping ought to set nicely and give an even, strong finish.—O. L. Crigler, in Concrete-Cement Age.



Detailed design for a store front.

Bungalow Style House of Good Design

In the accompanying illustrations is shown a house of distinctive design, which may be built at a comparatively low cost, erected on Arlington avenue, Toronto, by Messrs. Doner & Weis.

The design was brought by Mr. Doner from California, where this style of house is quite widely used.

A very pleasing external appearance is given by the cream-colored brick, brown stained shingles, and white

House recently erected by Messrs. Doner & Weis, on Arlington Ave., Toronto

and brown finish of windows and verandah. Another feature which adds greatly to the appearance of the house is the plaster sheathing of verandah pillars and beams.

The interior trim of dining room, parlor, and hall is of oak and chestnut, with fir doors. The stairs are well lighted by a good sized window on the landing, half-way up. The large front bedroom is very airy and especially well lighted by the broad casement windows shown in the illustration.

Progress in Fireproofing Wood

Persistent agitation throughout the country to reduce the fire hazard has, in many instances, led to the replacing of woodwork in buildings and other places with metal, brick and other material. Incidentally, too, it has led to many efforts to render wood fireproof, or practically so, that it may continue to be used for many of the purposes where it has been replaced by metal. Some of these efforts have proven too expensive to be practical, and some have developed farcical characteristics, and jokes have been made about the burning of the scrap and shavings of the fireproofed wood in the boiler furnace to make steam.

One of the most practical methods that has been adopted in this country is the idea of fireproofing doors and interior trim, by facing them with veneer and putting a cross-banding of asbestos between the veneer and the main core body. This serves the purpose of checking a fire, which may destroy the outer veneer face and ruin the woodwork generally, but it would not gain much headway, because the asbestos will check it pretty much as a tin covering on a wood door will prevent it burning through. A process for applying veneer in this way has been patented in this country, and the idea is making considerable headway, especially for door work for large office and public buildings.

There is a new idea, lately reported from England, in which wood is treated with a solution consisting mainly of phosphate of ammonia, which, it is said, serves to fireproof it, and at the same time make it more durable. The process of treatment is similar to the familiar process of creosoting wood to preserve it, as the treatment is given by the use of iron cylinders under vacuum to exhaust the sap, then under pressure to inject the solution. The sap is started by steaming, then the steam and sap are exhausted by vacuum, after which the chemical is turned in and pressure added.

The claims made for this process are that it fireproofs and preserves the wood, yet does not discolor it in any way or interfere with its use in cabinet and mill work. It is claimed that it can be worked, glued, painted, polished and handled just the same as any other wood, and that practically any wood may be treated. In support of the claims made for it is the fact that several railway companies in England are now using it, and that the British Admiralty has adopted this process for treating ship timber and lumber for boats and ships.

The cost of the process is given as ranging from 73 to 85 cents per cubic foot. As that would be equivalent to practically 7c per square foot, it is easy to see how the cost would interfere with its use generally for mill and cabinet work, as this cost itself is more than the average cost of lumber used. It would, therefore, only justify itself for very expensive work, and this will probably prevent it coming into general use, unless some way is discovered of materially reducing the cost of its application.

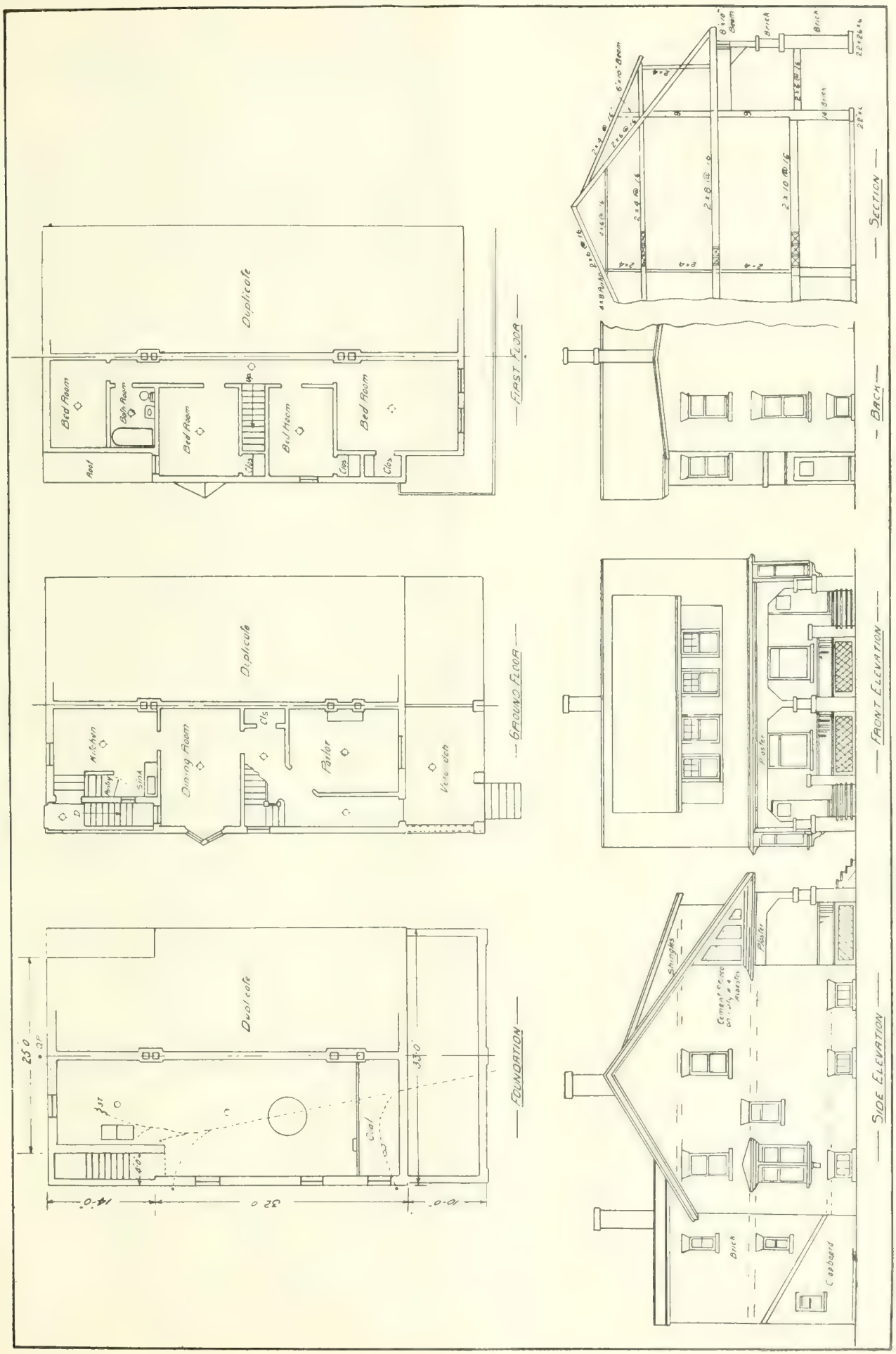
There is another process reported from England which consists in using a chemical mixture and dipping or soaking the wood in it before using, or if it is only desired to fireproof the outer surface it may be applied pretty much the same as paint and varnish. There have been filed with the Bureau of Foreign and Domestic Commerce at Washington, samples of treated wood, and information about the system. These will be loaned to anyone interested on application.—T. C. James in Woodworker.

Simonds Guide for Carpenters

A book of useful rules and illustrations in vest pocket size has been issued by the Simonds Mfg. Co. It contains 64 pages, and includes a great amount of valuable information in condensed form. Among the topics treated are rafters, stairs, use of brick and concrete, stains, estimates, weights and measures, etc. Readers of The Canadian Carpenter and Builder may secure a copy of this valuable little pocket book free by writing the Simonds Canada Saw Co., Limited, 95 St. Remi street, Montreal.

Hardness of Woods

The relative hardness of woods is calculated from hickory, which is the toughest and hardest wood in popular use. Estimating hickory at 100, we get for white oak, 84; white ash, 77; dog wood, 74; scrub oak, 73; white hazel, 72; apple, 70; red oak, 69; white birch, 65; black walnut, 65; black birch, 62; yellow and black oak, 60; hard maple, 56; white elm, 58; cedar, 56; cherry, 55; yellow pine, 53; chestnut, 52; yellow poplar, 51.



Plan and elevation of houses erected by Dover and Weis, on Arlington Ave., Toronto.

Causes and Prevention of Dampness in Buildings

By GEORGE MATSON

ONE of the most important points to observe in building operations is that of keeping dampness out of all parts of the structure, says George Matson, a member of the Royal Institute of British Architects. The dampness may be caused by (1) there being no damp-proof course, (2) the damp rising from the ground, (3) the damp earth against the walls, (4) rain soaking in through porous parapet walls and copings, (5) driving rains against walls, 6 burst pipes or leaks in roofs and other causes avoidable by a proper state of repair being maintained. Beyond this last cause, which should never obtain at all, to attempt after the building is occupied to remedy any of the other five omissions or faulty construction is a costly operation. For example, the cost of inserting a damp-proof course into a wall constructed without one is about as five or six to one, according to the material used, as compared with the cost of putting one in at the time the building is erected.

The provision of a damp course is in most towns a necessity, as the building laws require one. Some of the materials in most common use for this purpose are a double course of slate in cement, sheet lead, hard blue bricks, glazed stoneware slabs or tiles, asphalt, asphalted felt, etc., such damp courses laid costing from about 6 cents per foot superficial for bituminous sheeting (in rolls) to 25 cents per same unit for thick sheet lead.

The chief point to observe is that the damp-proof course covers the whole of the wall, and, in the case of slates, that they are of a stout quality and correctly laid to break joints and are properly bedded above, below and between each with cement-mortar gauged one of Portland cement to one of clean sand. For appearance sake, and to prevent a lodgment for rain, moss, etc., the slates are generally kept back ½ in. on the outside of the wall, and the damp-proof course pointed up in cement with a flush joint. Too much care cannot be taken to ensure that whole slates are used (and new ones at that), for, unless this is so, a straight joint occurs; then if the cement-mortar cracks when set at this point, water can ascend in the wall by capillary attraction.

It would appear to be a simple matter to lay a damp course of slates in cement, but it is a matter wherein an error in method can be made, and, as usual, it is one of those small errors impossible of remedying when once covered up. The cement compo bed should be spread over the wall to be covered preferably by the laborer, with the back of his shovel, or, failing that, by the bricklayer with his trowel, and at this point the bricklayer should commence the laying of the slates; but it is no uncommon practice for him to first of all cut the bed of compo across and raise it, as it were, into a series of small ruts or ridges, and on these to put the slates, tapping them home with the edge or the handle of his trowel. These ridges remain and set as such, and so the slates only have bearings at certain portions of their surface and invariably crack or snap at these points.

Sheet lead as a damp-proof course is the most expensive, as the lead should not be less than 5 lb. per foot super in weight. The bed on which it is laid must be smooth to prevent the roughness of the bricks or stones cutting through it, but at the same time its substance allows it to adapt itself to small irregularities of the surface on which it is laid. One disadvantage of this material as a damp-proof course is that under heavy loads it may squeeze out, and, where this occurs, the stones may spall off at the edges, for which reason the use of sheet lead between the beds of stones forming a column or pillar is now rarely used.

The cost of laying this damp course is certainly cheap, as it can be put to the exact width required, and the putting of it into position is a simple matter. Its great advantage, however, is a damp course to be inserted into a wall built without one, where it can be rolled up and unrolled as required as in Fig. 1; but generally where such damp courses have to be inserted the cost of cutting out the brickwork is so high that in many instances the total cost is reduced by using a bituminous sheeting which can be similarly operated.

The use of a course of blue bricks set in Portland cement as a damp-proof course is by no means a good one, as even the best of these bricks are porous, and, this being so, dampness can rise through them. Even where the brickwork for some few courses below the damp course level are of blue bricks a proper damp-proof course should be inserted.

Glazed stoneware tiles or slabs, made to the width of the wall, form a good damp-proof course. They may be anything from 1 in. to 3 in. thick and are 9 in. long. Best stoneware of itself is practically non-absorbent, but when glazed is emphatically so. This material can also withstand heavy loads. Fig. 2 shows this type of damp-proof article, and Fig. 3 a part of a damp course formed of this material.

The perforations, through the slabs are of great use, forming an excellent method of ventilating the underside, and particularly the corners and spaces under the wooden joists of ground floors so necessary if dry rot is to be avoided. Once more the bricklayer can spoil the efficiency of this damp-proof course in the jointing of the blocks or slabs. The groove or perforation at the joint is apt to become filled with mortar when moisture from the courses of brickwork beneath the glazed slab may rise up through this mortar in these vertical joints into the brickwork above and thus defeat the object of the glazed tile course at every 9 in. of its length. This defect is easily avoided by the foreman seeing that no mortar is put to this vertical joint, but that the hole or perforation is left quite clean and free from any jointing material. An attempt to overcome this difficulty on some jobs is often made by filling up the end grooves x and x in Fig. 2 with cement; but the cement as used is rarely of itself damp-resisting, so that this method cannot be said to get over the difficulty. Again, the cement joint may crack, when moisture can rise by capillary attraction, so it is much wiser to leave the perforations unfilled.

Asphalt as a damp-proof course is perhaps the best of all materials used for that purpose (excluding sheet lead on account of its greater cost). It is easily laid, is elastic to a certain extent, and yet able to withstand great pressure. There is also on entire absence of joints, and this is a particularly good advantage, as the joints in all other damp-proof courses are their weak points. At the same time, care should be taken to see that the asphalt is from a reputable firm, as some are much too brittle, while others squeeze under a com-

paratively small load, nor yet can some withstand the heat as the better material can, and others are merely a mixture of coal-tar, pitch and sand.

Before any asphalt is laid, the brickwork should be leveled, and it must also be dry and brushed clean, leaving the joints well flushed up with mortar. The course of brickwork to receive the asphalt damp-proof course should be laid with the frog downwards; in all other positions it is generally laid uppermost to insure it being filled up. The asphalt course should be of an even thickness, ½ in. or ¾ in., as may be specified, and to insure this correct thickness, screeds must be fixed to the top edges of the length of the walls when the molten asphalt is poured on and surfaced with wooden floats.

In order to make quite sure of the perfectness of the jointing necessary, say, from the leaving off of one day to the commencing on the following, the last foot or 18 in. of the over-night work should be left, but ¼ in. thick, allowing the next morning's work to complete the thickness insuring a waterproof joint.

Asphalted felts are serviceable as damp-proof courses, but care must be taken to see that the one used has a real claim for that purpose. Some simple tests to judge the quality and usefulness of some of the felts on the market are as follows: (a) To fold up the corners in such a maner as to form a tray, and if such tray will retain water for twenty-one days, leaving the underside of the felt perfectly dry, the sample may be considered good enough for its purpose; (b) pull the sample to pieces to see that each and every fibre is thoroughly coated with asphalt or bitumen. This last is important, as in the position in which it is to be used its edges would harbor insects, fungus, etc., if the felt was not saturated with bitumen to prevent it rotting. This liability to rot is one of the great disadvantages of felts as damp-proof courses, and, as such, some of the makes on the market hardly come within the meaning of the model by-laws of the local Government Board, "or other durable material impervious to moisture," for which reason asphalted felts are not permissible in some towns as a damp-course material. Some of the best makes of asphalted felts are guaranteed by the makers as being both "durable" and "impervious to moisture."

To Prevent Dampness Rising From Ground.

The second heading mentioned as a cause of dampness in buildings is that of dampness rising from the ground. To overcome this cause of dampness the model by-laws provide for a layer of good cement concrete rammed solid, at least 6 in. thick, to be put over the site to seal the ground air.

The number of voids in soils, as also their power of holding water, varies; but it may be said that all contain in smaller or larger quantities certain volumes of "ground air" at the surface and "ground water" below. As the latter rises or falls, according to the heaviness of the rainfall, so the "ground air" in the pores, so to speak, of the soil rises and falls, being on occasions expelled from the ground; also this ground air is drawn from the soil beneath a house on account of the greater warmth of the rooms over the site; also a rising temperature or a falling atmospheric pressure may extract or draw out such ground air.

Ground air is always impure, often resulting from the decomposition or decaying of vegetable or organic

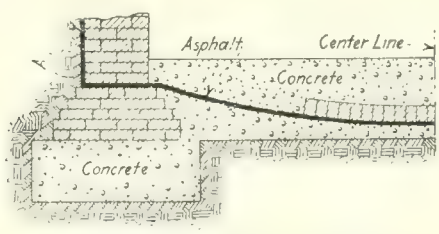


Fig. 7—Showing Arrangement of Damp Course to Resist Upward pressure of Water

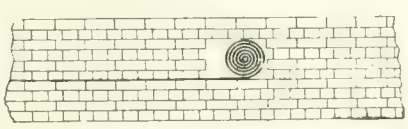


Fig 1—Inserting Damp Course in an Old Wall

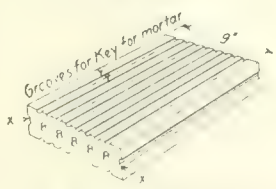


Fig. 2—A Glazed Stoneware Slab as a Damp-proof Course

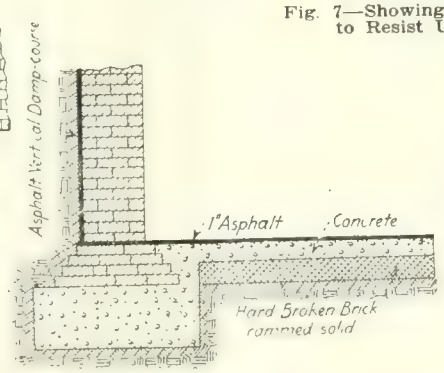


Fig. 6—Damp Course on Outside of Wall Below Grade and Extended Through Wall to Form Top Surface of Cellar Floor

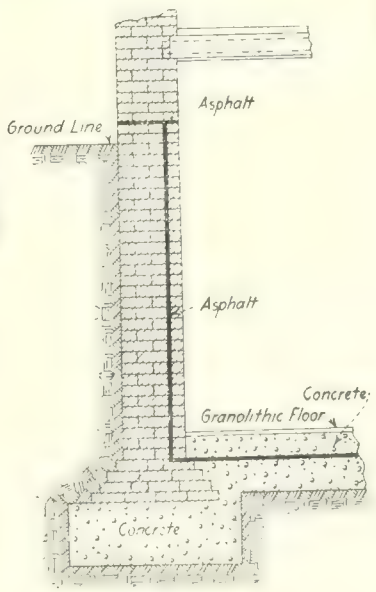


Fig. 5—Wall Rendered Damp Proof with Asphalt and Half-brick Built against it; or a space Left in the Brick Work and Hot Asphalt Poured in at Short Hights of the Work

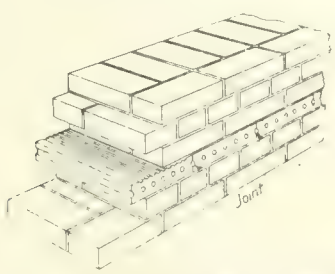


Fig 3—Portion of a Wall Wherein the Slab Shown in Fig. 2 Is Used as a Damp Course

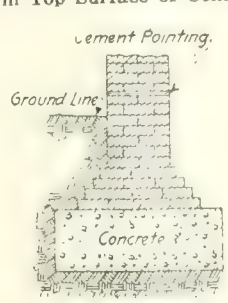


Fig. 4—A Damp Course of Slate

Some of the remedies suggested for preventing dampness in buildings.

matter, or from soakages from defective drains, cesspools, etc., hence the great need of the asphalting or concreting over the site, as required by the model by-laws.

The concrete used for this purpose must be 'good,' but it is certain that a large proportion of the concrete put over sites is mere rubbish, often being merely placed on top of the ground, the turf not even being removed. If the concrete were to be floated to a smooth surface on top, it would the better ensure the top half of the 6 in. of concrete acting effectively, as some of the concrete put down by speculating builders is deplorable.

It is possible that in basements the floor may be below the standing level of water, when, in addition to preventing the water entering the side walls, it may be desirable to make the basement practically a water-tight tank; and in cases where great pressure of water is found it may even be necessary to reinforce the concrete over the site in order to prevent it being lifted by the upward pressure of the water. Several methods of making basements water-tight are shown in Figs. 5, 6 and 7.

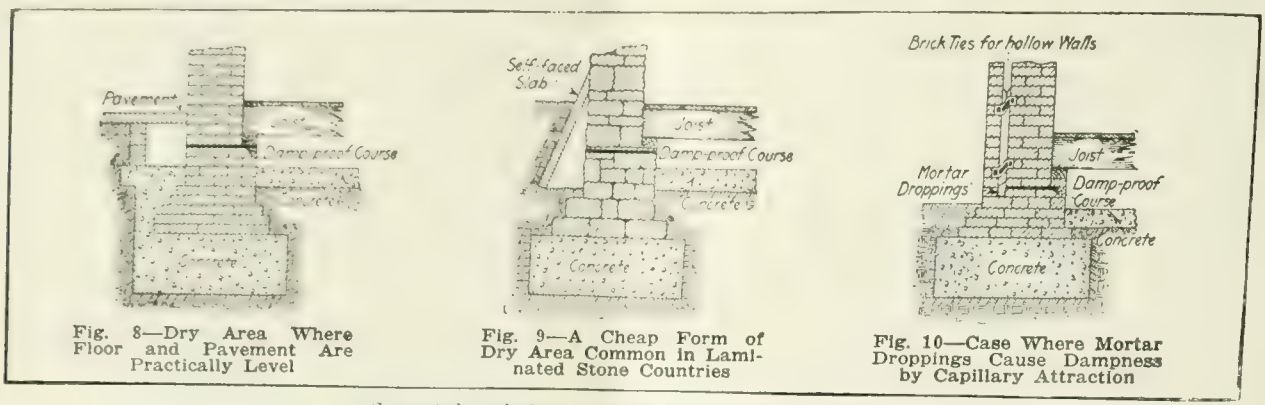


Fig. 8—Dry Area Where Floor and Pavement Are Practically Level

Fig. 9—A Cheap Form of Dry Area Common in Laminated Stone Countries

Fig. 10—Case Where Mortar Droppings Cause Dampness by Capillary Attraction

Suggested methods of preventing dampness in buildings.

Sealing Basement Side Walls.

In these same illustrations are shown methods of sealing the basement side walls against dampness coming in through them by reason of the damp earth next them, which was mentioned as the third cause of dampness in buildings. Some such provision is always necessary when the lowest storey of any building is below the level of the surface of the ground. In the words of the model by-laws, "that where any part of a floor of the lowest storey of such (new building) shall be in-ed to be below the level of the surface of the ground immediately adjoining the exterior of such storey, and so that the ground shall be in contact with the exterior of such wall, he shall cause such storey to be enclosed with double walls, having an intervening cavity between such walls of a width of 2½ in., and extending from the base of such walls to a height of 6 in. above the surface of the ground immediately in adjoining the exterior of such story."

Several forms of cavity walls and dry areas are shown in Figs. 8 to 13.

Care must be taken to observe that mortar fallen into the cavity between the two thicknesses of brickwork does not defeat the object of the hollow ways by allowing moisture to be drawn across it and up the interior wall by capillary attraction, as shown in Fig. 10.

Dampness of Parapet Walls.

Parapet walls are generally built of facing bricks—at any rate, on one side—and this class of brick is more frequently porous than that used for the general brickwork, so consequently it behooves the architect to find some means of preventing water penetrating downwards through the brickwork forming the parapet. One method is to build the whole of the parapet wall in cement-mortar, and, even better still, to insert one of the damp-proof courses already mentioned. Even when stone copings replace brick-on-edge and tile creasing, the same need for keeping water out obtains, the stone being porous. Where it is possible, it is much preferable for the slates to go over the gable ends of walls and form verges rather than have parapet walls to them.

Driving rains are a very common cause of dampness in buildings, particularly where the latter are in exposed positions. This condition may be met by building with hollow walls or by tile-hanging them. Where the need of prevention of dampness from this cause has been overlooked resort has to be made to covering the walls with slates or tiles afterwards.

Other endeavors that have been tried are, applying hot boiled oil to the brick walls with a large paint (or similar) brush. Dry weather should be chosen for this coating or coatings, and preferably a sunny day, when the walls will have been warmed by the sun.

Hot tar and melted pitch have been employed for the same purpose, in the same manner, and often, to improve the appearance of the wall, crushed shells or clean sand is thrown on to the tarred surface before it has set hard.

Treatment of Brickwork.

Another method that has been tried is to give the brickwork a coat of soft soap, followed by a coat of alum. There are also fluids specially made for the purpose of filling the pores or voids in the bricks and so stopping their porosity.

Lack of proper maintenance forms the sixth cause of dampness in buildings and is, unhappily, the most common of all. The ways in which slates or tiles get cracked or broken are countless. Workmen repairing or renewing glass in skylights, cleaning out gutters, telephone linesmen, are all responsible for such breakages.

It is not, however, only by cracked or broken slates that rain water is let into the most vulnerable part of a building—the roof; it is sometimes caused by an absence of proper lap in the slating in the first place. The insufficiency of lap may not be all over the surface of the roof, and even if it is it may not be necessary to strip the lot, but rather, as a trial, it would be best to strip a patch about 4 ft. super. around where the water is penetrating and to give an extra lap to the tiles or

slates if able to do so, or pieces of zinc can be inserted between the slates, pushed up as far as the nails will allow, but not showing below the edge of the slate..

Slaters may vary the lap, and they frequently do so. Starting with the specified lap at the bottom, they gain the confidence of the clerk of works at the outset, and he is perhaps thereby induced not to pay the strictest attention to the slating work, and is consequently "diddled" by loss of lap higher up the roof. However, the fault is not as bad as it could be, as if there is to be any change in the lap it is more necessary to have a larger one at the bottom than at the top of the roof, as the greatest volume of water collects at the former end.

Another cause of water finding its way through a slated roof is that the undereaves course is often too narrow, leaving a space instead of giving a lap, and as this is the lowest end of the roof, where the water collects in larger quantities, and where, consequently, the best lap is needed, rain soon finds its way through, but instead of plastered ceilings indicating the leakage the water soaks into the brickwork, and appears soon after in stains on the paper of the walls of the room.

Cause of Leaky Roofs.

Often roofs become leaky by reason of the timbers of the roof settling, or by insufficiency of strength to support the roof covering and workmen at times of repair or the additional weight of snow, at other times. In such cases the roof should be strengthened by strutting or firring it up.

The use of narrow strips of slate held, often, in position by one nail (two being impossible in the width) instead of using slate and a half or double slates is a cause of leaks in roofs, the small strips frequently getting displaced.

The careless or wilful holing of leadwork in hips and valleys may lead to drops of water entering the roof, as also the use of slates holed incorrectly and reversed end for end.

On zinc or lead flats rain often drives or is drawn by capillary attraction over badly-constructed rolls. The cloak of the lead covering of a roll should always be on the opposite side to that of the prevailing winds or rains. If flats are liable to be much walked on battens should be placed on them after the manner of snow gratings, and the same precaution should be adopted in slated roofs by providing cat or duck-ladders for access to the various parts of the roofs.

Other Causes of Dampness.

Other causes of dampness are leaky or choked up gutters. Both defects are heralded by falling or running water, and there is no excuse for gutters remaining in their bad condition long enough to cause real dampness to the walls. In searching lead gutters for defects, it is necessary to wipe the inside surface dry to find the crack, which will generally be noticed by water oozing from it.

Other items in a building requiring periodical inspection to avoid dampness entering are sky-lights, the timbers and putty of which rot with time unless properly coated with paint at regular intervals; and, lastly, it is necessary to keep all drains in good and clean working order.

Durability of Terra Cotta

The principal value of terra cotta lies in its durability. When made of the right materials and properly burned, it is impervious to water, or nearly so. When glazed, it is absolutely impervious, and hence not subject to the disintegrating action of frost, which is a powerful agent in the destruction of stone. It does not "vegetate," as is the case with many stones. The ordinary acid gases contained in the atmosphere of cities have no effect upon it, and the dust which gathers on the mouldings is washed away by every rainfall. Underburned terra cotta does not possess these qualities to so high a degree, as it is more or less absorbent.

Another great advantage possessed by terra cotta is its resistance to heat, which makes it a most desirable material for the trimmings and ornamental work in the walls of fireproof buildings. Although terra cotta has been used in this country for but a comparatively short time, it has thus far proved very satisfactory, and the characteristics above indicated would point to its ranking, in common with the better qualities of bricks, with the most desirable of building materials.—H. L. Fitzsimmons.

No man can attain perfection, but it is a good thing to keep aiming at it so that you may get as near to it as practicable.

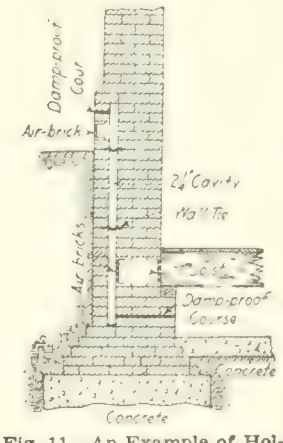


Fig. 11—An Example of Hollow Wall and Method of Treatment

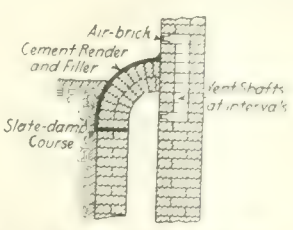


Fig. 12—Dry Area with Ventilation Shafts

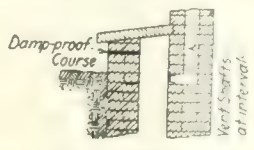


Fig. 13—Variation of Dry Area Shown in Previous Figure

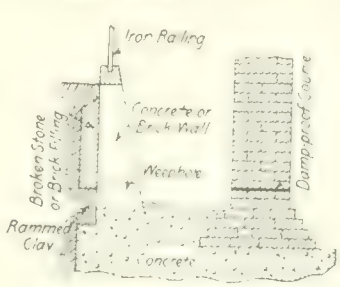
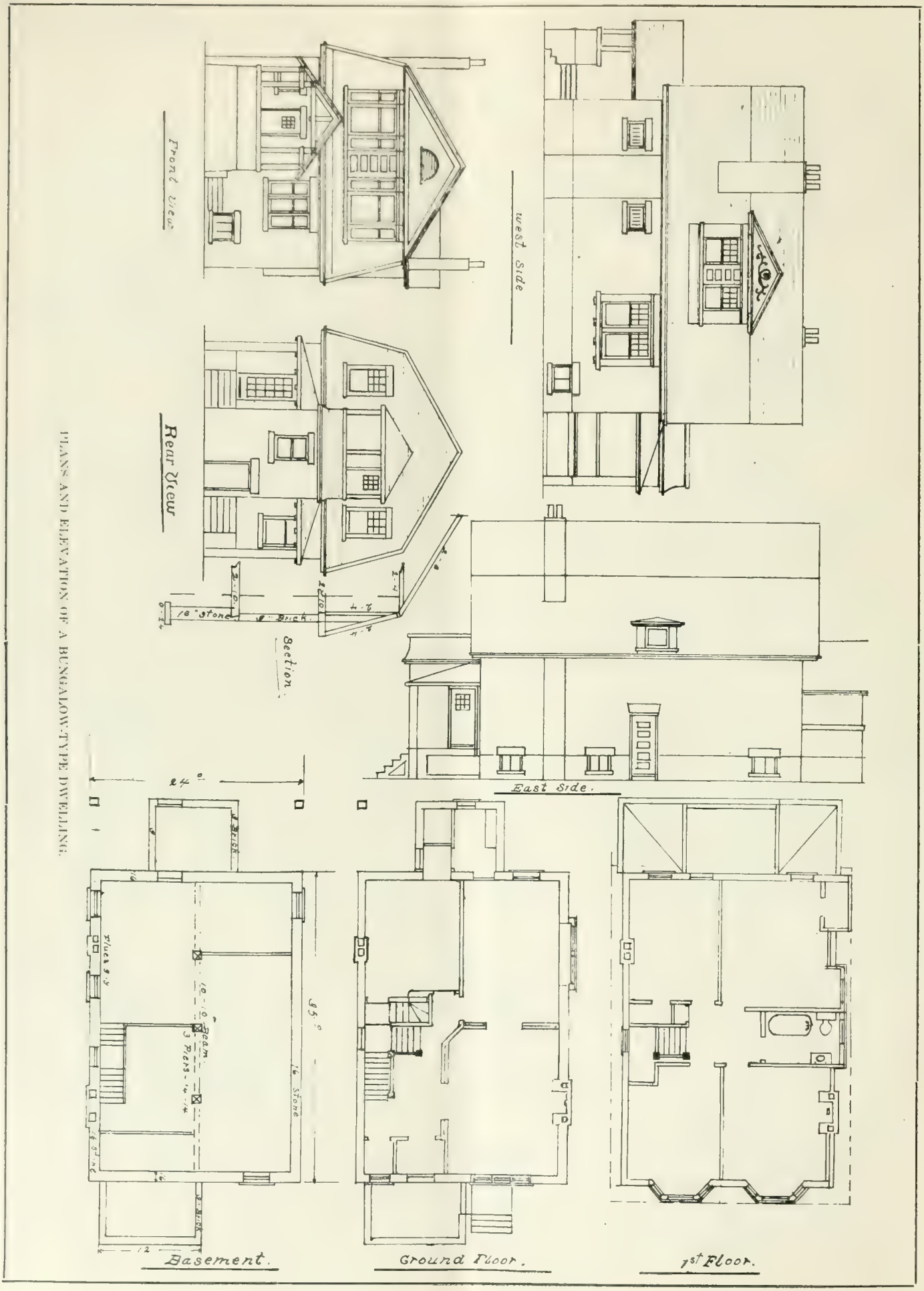


Fig. 14—An Open Area

Fig. 15—Types of Ties for Hollow Walls

PLANS AND ELEVATION OF A BUNGALOW-TYPE DWELLING.



Features of Modern Systems of Heating and Ventilation

BY ALFRED G. KING

THERE are two systems of heating in general use, viz., steam and hot water, and there are several modifications of each of these two systems. Vapor and vacuum heating may each be considered as a distinct system, yet they are really modifications of a steam heating system.

Steam heating may be subdivided into several divisions as follows:

1. Low pressure.
2. High pressure.
3. Vacuum.
4. Vapor.

Hot water heating may be subdivided as follows:

(a) Gravity circulation.
(b) Accelerated circulation.
(c) Forced circulation.

There are a number of methods of piping which are known and applied to each system. We shall illustrate and discuss the several methods, and endeavor to make plain to our readers the salient features of each.

In designing and installing a system of heating it should be kept in mind that each system is composed of various parts and appliances which, when properly installed, work in perfect harmony with other parts, and the failure of the system to perform the work as designed may be due to some small fault which a simple change or adjustment will rectify, or to some greater cause which has been overlooked by the designer of the apparatus.

For example, all parts of the system may be ample in size and properly installed, and yet the chimney may be insufficient in size and area for the use of the boiler installed on the work. Again, the failure of the apparatus to work properly may be due to the fact that air valves have not been supplied at points necessary to free the system of air—the enemy of the steamfitter—or, if they have been supplied, they may not be correctly adjusted.

Yet again, some pipe may not be properly graded, or, as a still greater fault, the boiler may be insufficient in size, or any one of a dozen or more faults may develop. These, and other points, we shall endeavor to make plain as we progress in our discussion and study of the various systems and methods of piping.

Low Pressure Steam.

A low pressure steam heating apparatus is usually installed as a gravity system; that is to say, the boiler is located below the level of the steam mains and radiators, the water of condensation returning to the boiler by gravity, hence, such a method is frequently referred to as a "gravity job."

There are several methods or systems of piping for low pressure steam heating. These may be listed as follows:

(a) The one-pipe system with dry returns.
(b) The one-pipe system with wet returns.
(c) The one-pipe system without returns.
(d) The two-pipe system.
(e) The overhead system.
(f) The circuit system.
(g) The divided circuit system.

Figure 1 shows an elevation plan of the one-pipe system with dry returns; this system is in common use owing to its simplicity and economy.

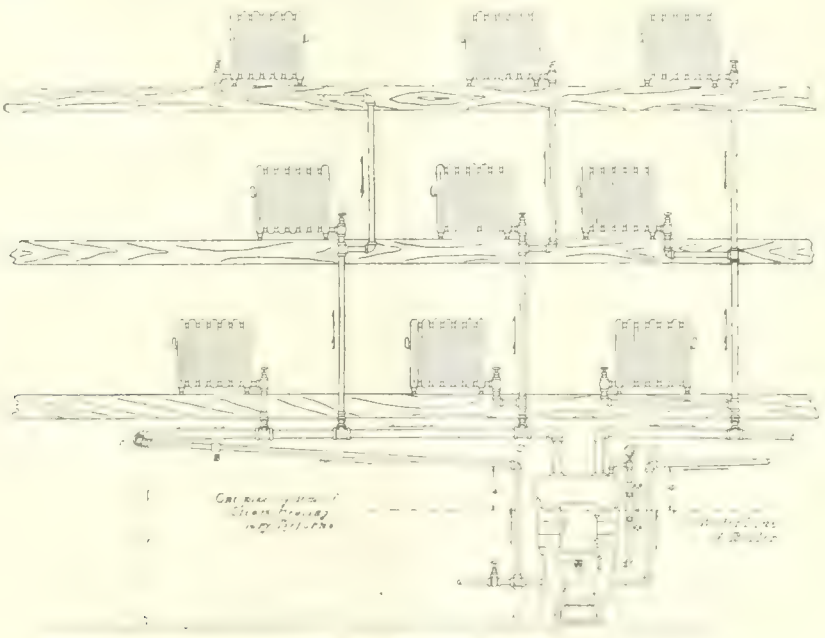


Fig. 1.

The steam main or mains (there may be more than one) pitch downward from the boiler. They are carried above the boiler to such a height as circumstances will allow, and from this point there is a gradual pitch downward of at least one-half inch in each 10 feet of length to the end.

At the end of the main two reducing elbows and a short or close nipple are used to form the connection to the return which, as a rule, is two pipe sizes smaller than the main. The elbow on the end of the main reduces one size and the elbow connecting with the return reduces to another size. The return as indicated on the illustration is brought back to a point near the

boiler, where a drop is made and the pipe is connected into the return opening of the boiler.

An automatic air valve should be placed on the return at C where drop is made, the elbow being tapped for this purpose. When air valves are used in this position they free the main of air when steam is generated on the apparatus, thus permitting the steam to be quickly supplied to all radiators connected to the line.

Attention is called to the coupling shown at E on the illustration. If a long length of pipe should be connected into the elbow at point A where the return is started, it would stand at a considerable angle from the main. By employing a short piece of pipe with a crooked thread cut on one end, the return may be thrown up almost in line with the main at A, the point

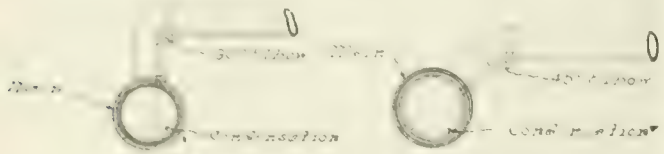


Fig. 2 Fig. 3.

of beginning, and thus gain all of the available headroom to keep the end of the return as high above the water line of the boiler as the height of the basement will permit

The one-pipe gravity system with wet return is also illustrated by Figure 1. The main, branches, risers and mode of making radiator connections are the same as for the dry method of piping, the only difference being in the manner of running the return which is taken back to boiler wet as shown by the dotted return line on the sketch.

In the event of installing the job as a wet return system, a drop is made with the return at the end of the main (A) to a point below the water line of the boiler, and the return is then brought back to boiler on the side wall or floor of the basement and the location of the automatic air valve is changed from C to A. Either one of these systems is particularly adapted for use in a long, narrow building where but one main is necessary or where two mains, one running in either direction, may be installed.

Attention is called to the manner of running the risers and the various methods by which the radiators may be connected to the piping; also to the manner of connecting the branches to the main. The connection from main to branches should always, for one-pipe work, be made with a 45 degree elbow and a nipple. For convenience in illustrating this is not shown on the sketch.

The old method of connecting branches with main was by the use of a 90 degree elbow and a nipple connected into the top of the main. Old-time fitters, and many others at the present day, employ this method, which is radically wrong. It is a continuance of the old style two-pipe method. The condensation returning through the branch enters the main directly on top of the steam, which is flowing through the pipe, saturating it, and reducing the efficiency of the main. Fig. 2 illustrates this feature.

When the 45 degree connection is employed the condensation enters the main without interfering with the flow of the steam. Fig. 3 shows this style of connection and the advantage of it. In this connection we may state that tests have shown that the reduction in the efficiency of the main where the top or 90 degree connections are used frequently amounts to 25 per cent. of its capacity, or, in other words, a main of certain size, 100 feet in length, with 45 degree connection to branches, is as efficient as a main 75 feet long of equal area when 90 degree connections are made to supply the branches.

The end of the dry return at C should never be less than 14 inches above the water line of the boiler if a pressure of from one to five pounds is to be maintained on the system. This is equally true of the end of the steam main at A when a wet return system is installed. The distance of 14 inches between the water line and end of main or return is conditioned upon the riser out of the boiler and the main piping being of sufficient size so that the steam will travel through it at a low velocity.

Doubling the size of a pipe increases its cross-sectional area four times and while it is not necessary that the risers out of the boiler should be made double the size of the mains, they should at least have an area 50 per cent. greater than that of the mains if a steady water line is to be maintained on the boiler. We shall discuss this later on when considering the subject of pipe connections.

For one-pipe work the branches as a rule should be one size larger than the risers or connections to the radiators which they supply. There are exceptions to this rule, however, the fitter will make no mistake in always adhering to it.

Consult the Manufacturer When Ordering Hollow Tile

Dealers in hollow tile are usually better able to estimate the amount required for a job than builders are, and contractors will do well when estimating a hollow tile job to send the plans to the nearest agency for a bid. Then specialists on hollow tile construction will estimate the amount of material required, adding the proper amount for breakage and including the necessary number of jamb tile for windows, small tile for special places, and flat tile for various purposes. In this way an order of tile delivered at the job will be found to contain everything in the way of tile required for efficient tile-laying.

Builders who are about to start their first tile job will also do well to examine the booklets issued by hollow tile manufacturers. In many cases they can consult with hollow tile experts, either verbally or by correspondence, gathering much useful knowledge about the quick handling and laying of tile—information that makes them better equipped to turn out first-class work at a minimum of cost. Almost invariably the first tile job makes a hollow tile expert of the builder, and the first job is very apt to bring him more work in the same line.

Waterproofing for Lime

The manufacturers of "Pudlo," a cement waterproofing, have introduced "Lime-Pudlo" for waterproofing lime. Samples are being mailed on request by the agents for Canada, the W. H. Thornhill Co., 160 Princess street, Winnipeg.

During the summer season the advocates of hard oil or grease should have their inning, because in warm weather grease cups are more liberal with their lubrication and less likely to become stiff and let journals run hot.

Roof Flashing Methods

I am enclosing some sketches and a description relative to the manner of applying the flashings to the slag roof on the ash handling building of an electric generating plant, at the same time strongly subscribing to the arguments for tin roofing as presented in your magazine.

There was a large vault light of cast iron and prism glass set in the plane of the roof, the frame of the vault light resting on the steel girders of the roof abutting all sides of the light. The usual reinforced concrete slabs spanning the space from girder formed the remainder of the roof, together with the two intermediate mullions of the vault light, which was in three sections. These mullions of 24-inch width and of a length equal to the transverse dimensions of the vault

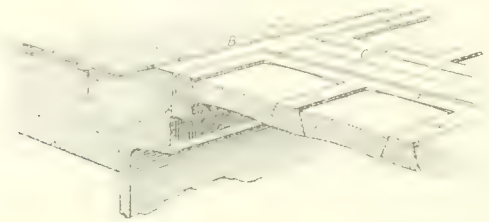
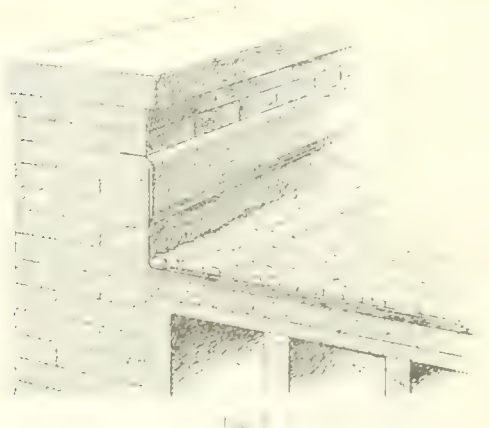


Fig. 1.

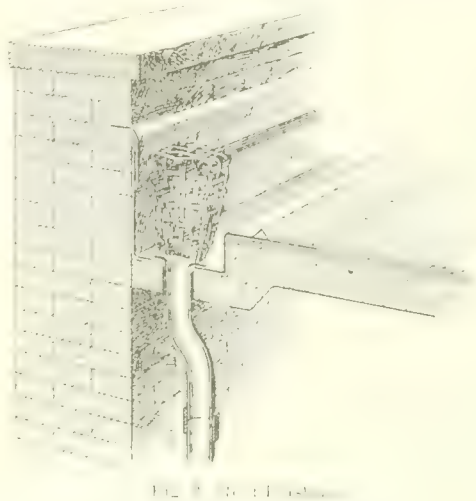
light, were not covered with tar, but with copper, the connection with the vault light being the same as with the side flashing shown in Fig. 1 of the accompanying sketches. A five-ply Barrett specification slag roof covers the roof, and after the cast iron framework of the light was set, the three-ply of the felt was run out and stuck to the roof. Then all copper flashing was set, that for the watertight connection with the light was done by bending the copper strips to fit the shape, as shown by B in Fig. 1, and laying them in the vault light frame A. Where the flashing crossed the transverse and longitudinal flat ribs of the light C, the cast iron was previously thoroughly cleaned and ground down to a smooth surface and tinned, so that the copper could



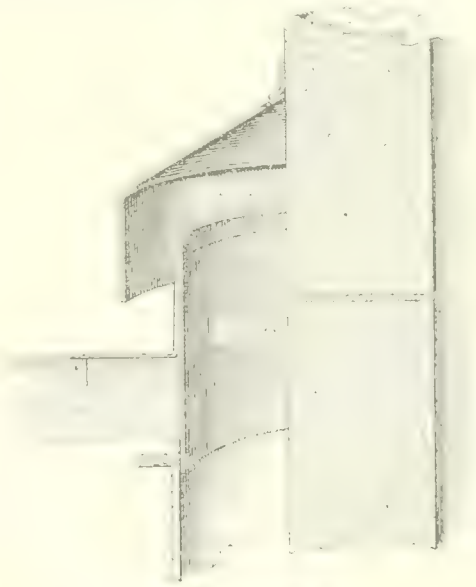
be soldered to it at that place at the time of applying the flashing. With the flashing and covering for the cross mullions in place, the rabbets of the ribs were filled with the blue putty used by the vault light men, and the tiles of glass, which, by the way, were composed of small sections of glass about 4 by 6 inches in size, were set by a sort of brimstone cement into frames, thus making units of about 2 by 3 feet in size, they being screwed down to ribs and the surplus putty cleaned and smoothed off. As will be seen in the sketch, a slight crown was given to the concrete forming a gravel guard to prevent the tar from running or the slag from blowing on the light. As an additional precaution, however, a slight guard was formed in the flashing at the top of the light, for the flow of water at that place would be strong enough to wash the gravel over the crown mentioned.—J. H. T., in Sheet Metal.

Mosaics Upon Reinforced Concrete

At an earlier time, reinforced concrete was made to imitate stone construction to a large extent, but at a later stage architects commenced to use forms which were adapted to the nature of the material, which is, of



course, only logical. The same applies to the question of ornament upon reinforced concrete, and while moulded relief can be very well used, it is found that the flat surfaces are also well adapted to receive colored tile decoration, with very good effect. More recently, a mosaic decoration is coming into use, for the concrete most naturally lends itself to imbedding of



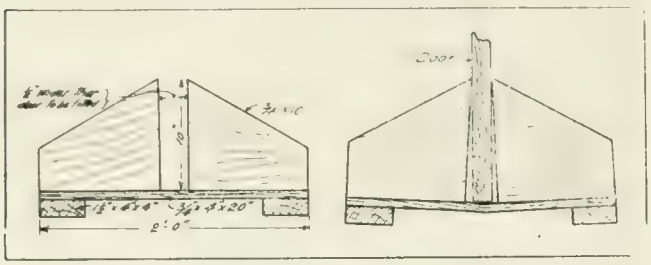
mosaic directly in the material, and this can be done with very little trouble. This method is beginning to be employed in France for house trimmings, and the bright colors of the mosaics add considerably to the otherwise rather dull hue of the cement.—Scientific American.

Carpentry and Woodworking

Useful Device for Fitting Doors

Various methods are used by different people for holding doors and sashes while edges are being planed and hinges fitted.

One method used is to nail a board between the door jambs and cut in it a notch for holding the door. This method has the disadvantage of blocking the doorway while the door is being fitted. Another way is to cut a groove in the end of stool or trestle, and still another way, described in a past issue of The Canadian



Device for holding doors while edges are being planed and hinges fitted, etc.

Builder and Carpenter, makes use of a block and a wedge. With this method, however, the wedge must be adjusted each time the door is moved.

In the accompanying sketch is shown an arrangement of very simple construction, which is free from these drawbacks, and may be used for planing all kinds of doors and sashes. It is constructed as follows: At each end of a piece of straight grained ¾ in. x 4 in. x 2 ft. pine, or other wood which will bend easily without breaking, is nailed a piece of 1½ in. x 4 in. x 4 in., and on top of this are nailed two pieces of ¾ in. x 10 in., as shown in sketch.

When the door is placed in this support, its weight bends the piece of ¾ in. stuff and causes the two pieces of ¾ in. x 10 in. to close on the door like the jaws of a vise. When the door is lifted the jaws automatically open.—R. M. Rekert.

Hamilton Lumber Dealers and Contractors Enjoy Outing

The eleventh annual picnic of the lumber dealers and contractors of Hamilton was held to Queen Victoria Park, Niagara Falls, on Saturday, August 22, and was in every way a success. There was an attendance of about nine hundred, and the day was thoroughly enjoyed. Games and races of all kinds were held, and valuable prizes were presented to the winners.

Details of Wooden Fence With Brick Pillars

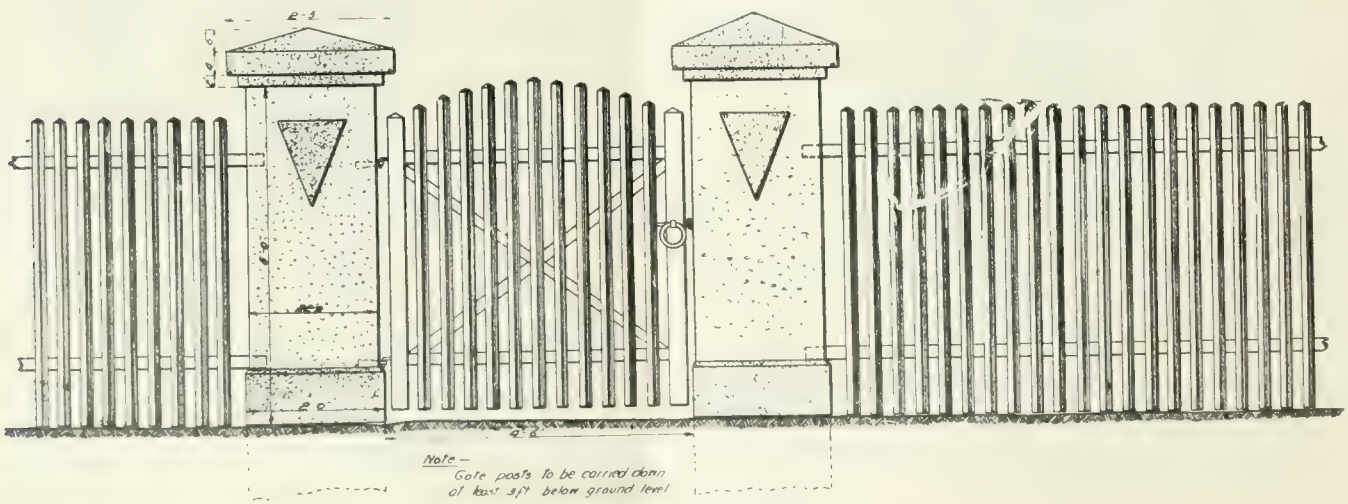
The accompanying illustrations show the details of a picket fence surrounding a residence in St. Catharines, Ont. The pickets are 1½ in. square and topped, set on the diagonal, and this method gives a better appearance than were they set straight.

The pillars are 25 in. square (three brick square), and finished in stucco.

The owner wanted the fence to come on the centre of the pillars, so the fence was made to curve slightly and fasten into the centre of the pier, as shown in the illustration.

The rails are 2 x 5 in.

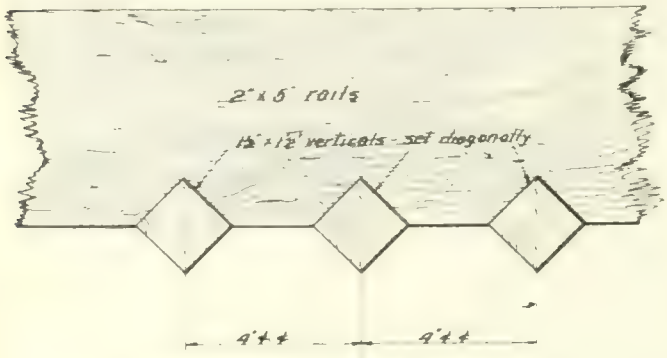
Total length of the fence is 355 ft.



Wooden Fence with Brick Pillars.

How to Protect the Tool Box

No man likes to have his tool box all nicked up with saw tooth marks. How many carpenters, whether working in a shop or on a job, have not seen other men on the work come up, saw a piece of wood on someone else's tool box, when the saw has finished its work, put



Detail of picket arrangement of wooden fence.

a nick in the box? Every mechanic knows the annoyance this causes.

I have overcome this difficulty by screwing on a thin piece of iron, half an inch wide, all the way round the edges of the lid of my tool box. Thus, if a man does attempt to do some sawing on the box, when his saw cuts through the wood and hits my box, more damage will result to the saw than to the box.—E. Hoyles.

* * *

Flooring One Half Inch Thick

The latest thing in hardwood floors is said to be plain and quarter-sawed oak one-half-inch thick in the finished size. This is tongue and groove flooring, and is destined to take the place of the regulation 1 x 3 in. flooring, which is finished 13-16 x 2¼ in. face. The new thickness in actual practice proves as durable and makes as good a floor as that which is 13-16 in. thick, and it has the added advantage of being more reasonable in price and of wasting less in laying. The regulation 13-16 in. flooring wastes one-third, whereas the ½ in., being 2 in. face measured as 2½ in., wastes only 25 per cent. It is stated that there is a saving in the cost of ½ in. floor of from 19 per cent. to 25 per cent. Of course, it is needless to say that the ½ in. flooring is immeasurably superior to the cheaper flooring strips that are being laid to such an extent, as well as the ⅜ in. material. It is quite probable that before long the ½ in. flooring will become the standard size in hardwood flooring.—Canada Lumberman.

* * *

Construction Details of Queen Post Trusses

Herewith are shown details of how to construct Queen post trusses. This method is used extensively on the larger buildings in the Old Country, but has not come into common use in this country.

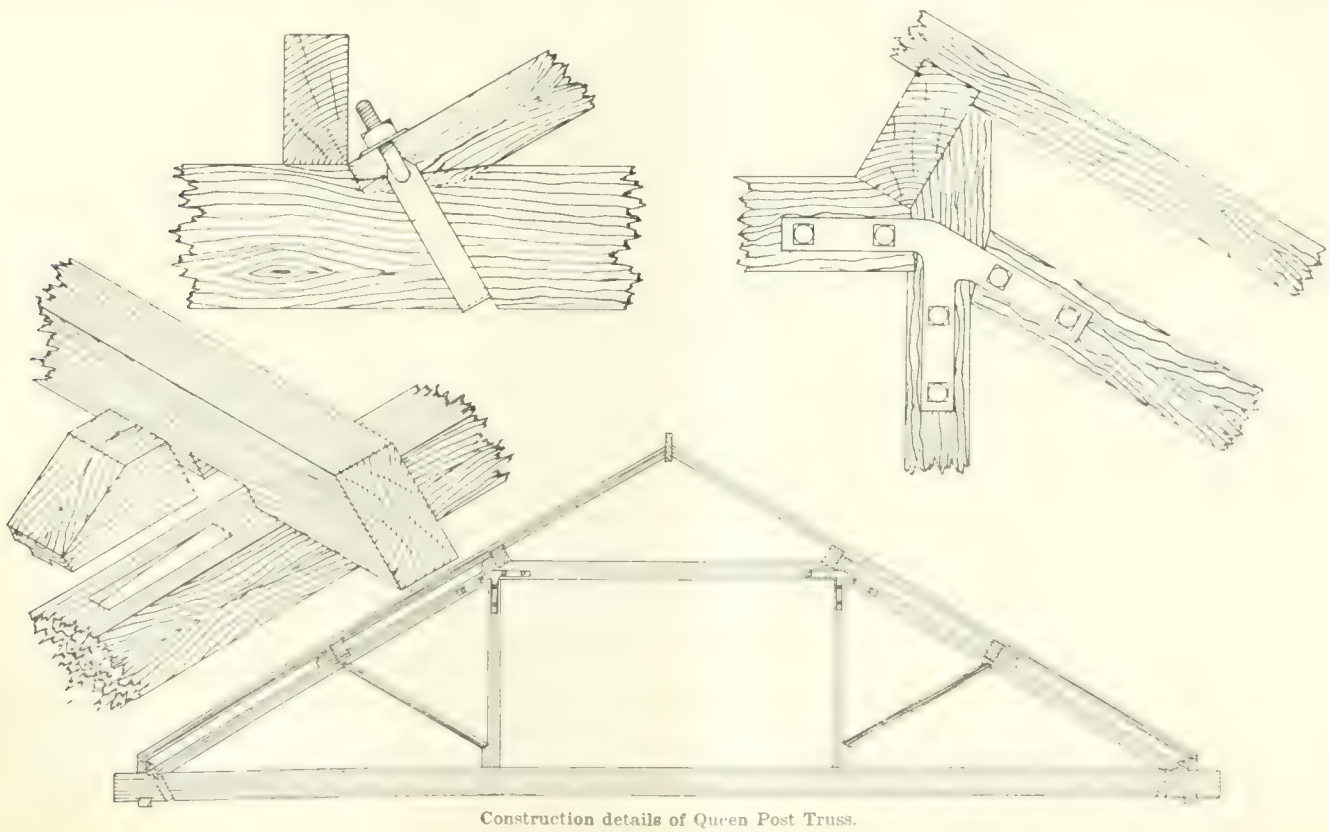
The big feature about this method is the strength it gives, as the drawing will show.

* * *

Making a Circle Tread and Riser

The sketch herewith explains my method of making a circle riser. To make the form of core, first draft a pattern, using as a diameter the distance between face of first riser and back of third riser; the run of the stairs will determine this.

Dividing the pattern into four equal parts, as shown at A, B, C, Fig. 1, will allow of smaller pieces being used, thereby cutting the cost for material to the lowest figure. Any thickness of material can be used, just so all pieces in each course are same thickness. When blocking out the pieces on band saw, cut to the

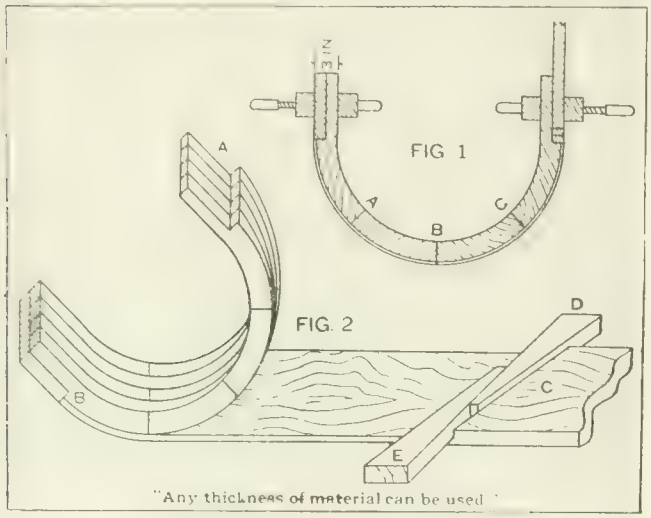


Construction details of Queen Post Truss.

line on inside of circle; but allow about ½ in. over line on outside to allow of recutting after form is glued up. I always glue up form in veneer press, never using any nails. When recutting the form, saw notch out at each end, as shown at A and B, Fig. 2.

To prepare veneer for form, cut out piece ¼-in. wider than finished thickness of form and about 30-in. longer than length of straight riser. Place pattern or form on piece as shown at B, Fig. 2. Mark where circle begins at B; roll form gently over until A touches riser at C, and mark where circle ends, allowing 1-in. for wedge room. Gage edge of riser, letting 3/32-in. stand. Saw out on band saw by holding riser up against a block which has previously been made parallel with saw. Cut directly on line, as any unevenness in thickness will cause veneer to break in the thin places. The thinner you can saw the veneer the better success you will have in bending. After recutting form, glue-size and let stand two hours before veneering.

When ready to veneer use same method as in marking. Fasten form to veneer at B with handscrew, roll



over and place another handscrew at C and tighten just enough to hold form in place. Drive the two wedges, D and C, just hard enough to bring veneer up to form tightly, and hard enough to bring veneer up to form tightly, and tighten up handscrew at C. If veneer has been sanded before sawing, a great deal of time will be saved in cleaning up the riser after veneering. After taking riser from clamps, joint off edges of veneer even with form and you are ready for your tread.

The tread is made by gluing up pieces of the required thickness, 3-in. wider than diameter of circular riser and 18-in. longer than straight treads. Place riser upon this piece, face up. For marking use a gauge made by boring a hole for lead pencil in block of wood, 1½-in. from end. Place end of gauge against riser and draw around circle, thus making tread conform exactly to shape of riser. Make gauge for marking cove under nosing in same way, only placing pencil ⅞-in. from end of block. This method will work equally as well on any part of circle.—C.L.M., in Wood-Worker.

Wishing is a cheap form of entertainment, and, like most cheap things, not worth the price. There's lots of satisfaction, however, in going after a thing and getting it—even a very small thing.

Features of Future Skyscrapers

That the skyscraping office building of the near future will contain many new features was the prediction of C. A. Patterson. "It will be a matter of a very short time," said Mr. Patterson, "when big office buildings will have 'elevators' running horizontally on different floors. Furthermore, patrons will pay fares to ride on these cages and get transfers from the vertical lifts to the horizontal, just as we get them on street cars now. They will pipe pure air into the big city buildings, just as they pipe pure water, and bungalows built on top of tall buildings will house the owners in summer. A building permit for such a bungalow already has been taken out in Chicago."

Reason Why a Tall Toronto Building Collapsed

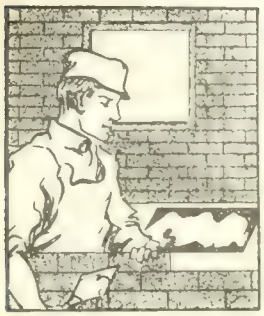
The Union Loan and Savings Company building, Toronto, partially collapsed on the evening of September 1. Two complete sections have fallen out of one wall into the excavation for the new Excelsior Life Building alongside. The reason of the collapse is best explained in the following statement by City Architect Pearce:

"The wall was perfectly safe when our inspector looked at it yesterday afternoon. At that time the foundations were standing on a breastwork of clay from five to eight feet wide. I have learned subsequently this ledge was cut off, consequently there was neither support for the shoring or the foundations, and there was bound to be a collapse."

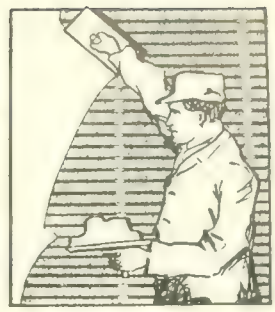
Acting City Architect Price, who has been on the job since the collapse, said: "The clay at the bottom of the foundation is useless as support, due partially to the continued rains, and the wall has pulled away from two of the supports, leaving only one beam gripping. There is a slant from the perpendicular of at least three feet or more. The only thing to do now is demolish the building, and if we have dry weather that may be accomplished before any further portion collapses."

It is said that the Chinese brick of more than 2,000 years ago are still found firm as ever in the famous Chinese wall, notwithstanding the severe climate of North China. If the crude brick of earlier days stand the test of time like that, what may not be expected of the modern, well-burned clay products?

Picturesque garage of Mr. D. Fitzgerald, 154 Glen Road, Toronto.



Brick Work and Plastering



Proper Way to Lay Hollow Tile

Hollow tile is not so easy a material to slight as other masonry materials. A poor job of hollow tile looks poor, even in the eyes of the inexperienced. However, there are good ways and bad ways to lay tile, and the careful contractor will do well to adopt methods which will produce the best results. Hollow tile are set on the edge. The best job is obtained by spreading a bed of mortar on the outside, inside, and middle webs (referring to an 8 x 10 x 12 in. tile). No weight is carried on the cross webs, so no mortar for these is necessary. After a corner tile is set, the next one to be placed is buttered liberally on the side, at back and front edges with a spread of mortar about 3 ins. wide. When this tile is jammed up against its neighbor it sinks to its bed, squeezing out a thick "key" of mortar at the edges. At the same time a strong vertical joint is provided by the buttered sides. Thus, a hollow tile unit in place, properly laid, is tied with mortar at top, bottom and both sides. Undoubtedly, vertical joints are greatly improved when deep scored tile are used, as mortar spreads into the grooves and sets, forming a perfect bond.

Inspection and Methods of Laying Terra Cotta

A sharp, metallic, bell-like ring and a clean, close fracture are good proofs of compactness and strength. Perfection of form is in the highest degree essential, and can result only from a homogeneous material and a thorough and experienced knowledge of firing. No spalled, chipped or warped pieces of terra cotta should be accepted, and the pieces should be so hard that they will resist the scratching with the point of a knife. The blocks should be of uniform color also, and all mouldings should come together perfectly at the points. Terra cotta with a vitreous surface and mat-glazed terra cotta should be so non-absorbent that water will lie in drops on its surface without being quickly absorbed. Full-glazed terra cotta should be so non-absorbent that ink will not penetrate the surface, and may be entirely washed away with water.

Terra cotta should always be set in either natural cement or Portland cement, mixed with sand, and in about the same way as stone is set. As soon as set, the outside of the joints should be raked out to a depth of three-quarters of an inch to allow for pointing and to prevent chipping. The terra cotta should be built up in advance of the backing, one course at a time, and all voids, except those projecting beyond the face of the wall, should be filled with grout or mortar, into which bricks should be forced to make the work as solid as possible. All blocks not solidly built into the walls should be anchored with galvanized iron clamps, the same as for stonework, and, as a rule, all projecting members over 6 in. in height should be anchored in this way. After the walls are up, the joints should be pointed with Portland cement colored with a mineral pigment to correspond with the color of the terra cotta. The pointing is done in the same way as in stonework, except that the horizontal joints in all sills and washes of belt courses and cornices, unless covered with a roll, should be raked out about two inches deep, calked with oakum for about one inch, and then filled with an elastic cement.—H. L. Fitzsimmons.

Weight and Strength Tests of Terra Cotta

The weight of terra cotta in solid blocks averages 122 lbs. per cubic foot. When made in hollow blocks 1½ in. thick, the weight varies from 65 to 85 lbs. per cubic foot, the smaller pieces weighing the most. For pieces 12 by 18 in. or larger on the face, 70 lbs. per cubic foot should be a fair average. The crushing strength of terra cotta blocks in 2 in. tubes varies from 5,000 to 7,000 lbs. per square inch. Hollow blocks of terra cotta, one foot high, unfilled, have sustained 186 tons per square foot. From these and other tests I would place the safe working strength of terra cotta blocks in the wall at 5 tons per square foot when unfilled, and at 10 tons per square foot when filled solid with brickwork or concrete. If it is desired to test the strength of special pieces, two or three small pieces should be broken from the blocks and ground to 1 in. cubes, and then tested in a machine. Should the average results fall much below 6,000 lbs., the material should be rejected.—H. L. Fitzsimmons.

A Point to Remember in Ordering Hollow Tile

For economy in construction and efficiency in handling, an order for hollow tile should always include a proportion of small pieces. For instance, though the outside walls are of 12 x 12 x 8 in. tile, a certain number of 12 x 6 x 8 in. tile should be included—half as high as standard. These will be found convenient to use where courses must be narrowed, as under a window or the last course at the wall plate, for they save breaking and fitting standard tile to make smaller units.

Another convenience in a bill of tile is the custom of including in the shipment a few pieces of 1 or 2 in. tile. These usually come in the shape of larger units, divided into smaller parts of grooves, and easily broken apart by a light blow of the trowel. Many gaps in the wall too small for standard tile can be filled with these.

The Application of Stucco to Brick Work

"What is the proper treatment of an old brick wall and a new brick wall for the application of Portland cement stucco, and what is the procedure in applying the stucco, so far as it differs from the usual practice in the application of stucco to other surfaces?"

Most Important Point.

In applying stucco to old brick walls, the most important point is that the old surface must be thoroughly cleaned; if coated with paint, this must be scraped or burned off, and if uncoated, the surface must be washed with a solution of muriatic acid mixed in the proportion of 1 part commercial muriatic acid to 5 parts of water. The wall should be scrubbed with this solution, then thoroughly cleansed with clean water.

The joints between the brick work should be picked back from the face of the bricks to a depth of ½ in. to ¾ in., so as to form a key for the plaster. Immediately before applying the plaster, the surface of the walls should be thoroughly soaked with water, for, on account of the porous nature of the brick, water would be absorbed from the plaster, thus injuring its strength, unless the brick were thoroughly saturated beforehand. After this the work does not differ materially from ordinary stucco construction.

Sometimes, instead of applying the cement plaster directly to the brick, metal lath is fastened to the brick and the stucco placed on it. Metal furring strips are attached to plugs driven into the joints of the brick work, and the lath is fastened to these strips. This method of construction is always advisable for covering brick chimneys, so as to prevent cracking due to extreme temperature changes.

In applying stucco to new brick work, the procedure is practically the same as described, except in the matter of cleaning off the surface, though the walls should be brushed to remove any mortar that may have splashed on the surface of the brick at the time of laying up the wall.—C. W. Boynton.

Two Methods of Application.

There are two methods of procedure in applying stucco to an old brick wall—the stucco can either be applied directly to the surface, or the old brick wall can be covered with furring strips and metal lath and the stucco applied to the lath.

If the stucco is applied directly to the wall, the mortar joints should be picked out from ½ in. to ¾ in. from the face of the brick work, and when the first coat is applied it should be forced into these crevices to form a bond. It is absolutely necessary to clean the brick before putting on the stucco. If the surface of the wall has been painted or previously plastered, these coatings must be removed so as to allow a clean surface to which the stucco will adhere.

Before applying the stucco, the surface of the brick wall must be saturated with water, and must be kept in a damp condition during the application of the first coat. On account of the porous nature of the brick, this requires considerable water.

In case the surface is of such condition that the stucco will not adhere firmly, metal lath should be used.

Instead of applying the cement plaster directly to the face of the brick, wire or expanded metal is used in practically the same way as on a frame building. One-half-inch furring strips are placed from 12 in. to 18 in. apart, and are attached to wooden plugs driven into the joints of the brick work, flush with the surface. The wire or metal lath is fastened to these strips.

In applying the first coat of stucco no hair is used, and the plaster is forced through the lath until the space between the wall and the lath is entirely filled with mortar. This ensures the lath being thoroughly embedded in the stucco, and protection is afforded against corrosion.

A new brick wall, to which stucco is to be applied, is usually built with the joints recessed so that it is unnecessary to cut the mortar out to the ¾ in. depth. The method of applying stucco is, in this instance, similar to the method used for old brick walls after they have been cleaned. Two coats are usually sufficient for this class of work, any finish desired being secured from the second coat.—L. R. Ferguson.

Applying to Old Brick Walls.

For old brick walls, first see that the wall is thoroughly cleaned; if joints are open, it is so much better, and I find if you chisel out some of the joints and insert nails in them it is a great benefit, holding the stucco firmly to the wall, but be sure to have the wall thoroughly wet before applying the first coat.

The first coat should have some lime mixed with the cement, and should be broomed out rough. Let this set until it is strong enough to carry the second coat. The second coat should have lime, also a little hair mixed with the cement. For the pebble or third coat, to every barrel of pebbles and lime mixed together, use ½ bag of cement, not too stiff, so when thrown it spreads nicely. Hydrated lime is preferable with pebbles. For new brick work, proceed the same as for old. If white finish is desired, use white Portland cement; if another color, use any good Portland cement.—T. V. Smith, in Concrete-Cement Age.

Colored Terra Cotta and its Uses.

Within the past twenty years a great impetus has been given to the production of special colors in architectural clay products. In 1885 fully four-fifths of the terra cotta produced in America was red. Now there is less of red used than of almost any other color. Buffs and greys of several shades, white and cream—white are now the prevailing colors. By the use of ceramic colors almost any required tone may be produced, and the effect obtained by using glazed terra cotta of various colors in combination, such as blue, yellow, white, purple, brown, old gold, green or red, is often very beautiful. If any particular shade of color not included in the manufacturer's standard samples is desired, the builder or architect should consult with the manufacturer, who will then experiment until the required color is not only produced, but guaranteed to be permanent and free from all tendency to crack. It is generally agreed that there is a great field for this polychrome terra cotta, especially for theatres, restaurants, and buildings of a similar nature, for interiors, loggias, fountains and department stores.

Its Use Is Ancient.

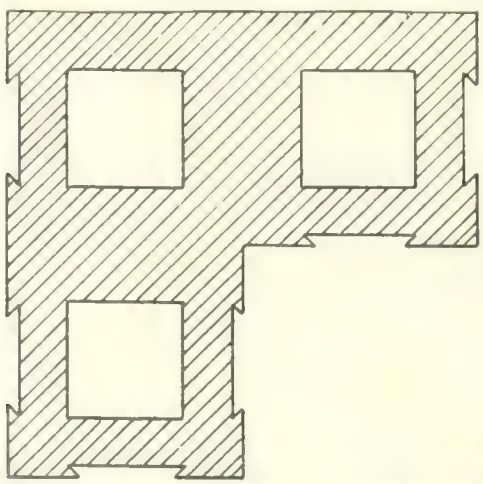
Although the art of using colored terra cotta is very ancient, having been in practice before the Christian era, it is, to some extent, an undeveloped field in this country and offers alluring possibilities in architectural design and construction. It can be used in a very modest and sparing way as well as very profusely, and either in soft tints or in brilliant colors, as the taste of

the contractor or architect may dictate. Where a rich decorative treatment is required, as in the interiors of public buildings, like our great stations, hotels and theatres, polychrome terra cotta can be employed most effectively and economically. In variety and beauty of tones, terra cotta has now reached a very high standard of excellence, and may be used by the architect to express the highest type of his art. The almost unlimited possibilities presented by the judicious application of colored glazes for exteriors as well as for interiors, has awakened an unusual interest in the use of polychrome terra cotta, a building material with superior qualities of resistance against the deteriorating effects of time and of the action of fire and frost.

A Substitute for More Expensive Materials.

Terra cotta is not imitation stone and should not be used as such. It is a material having peculiar qualities which give a distinctive character, and, therefore, to be successfully used, it should be employed in such a way that it will appear as an imitation of, or as a cheap substitute for, some more expensive material. This may be brought about in several ways. There may be used certain forms and certain styles or ornament more characteristic of terra cotta than of any other material.

H. L. Fitzsimmons.



Samson Interlocking Tile block designed by W. W. Smith, Shallow Lake. It can be turned to show plain or scored surfaces.

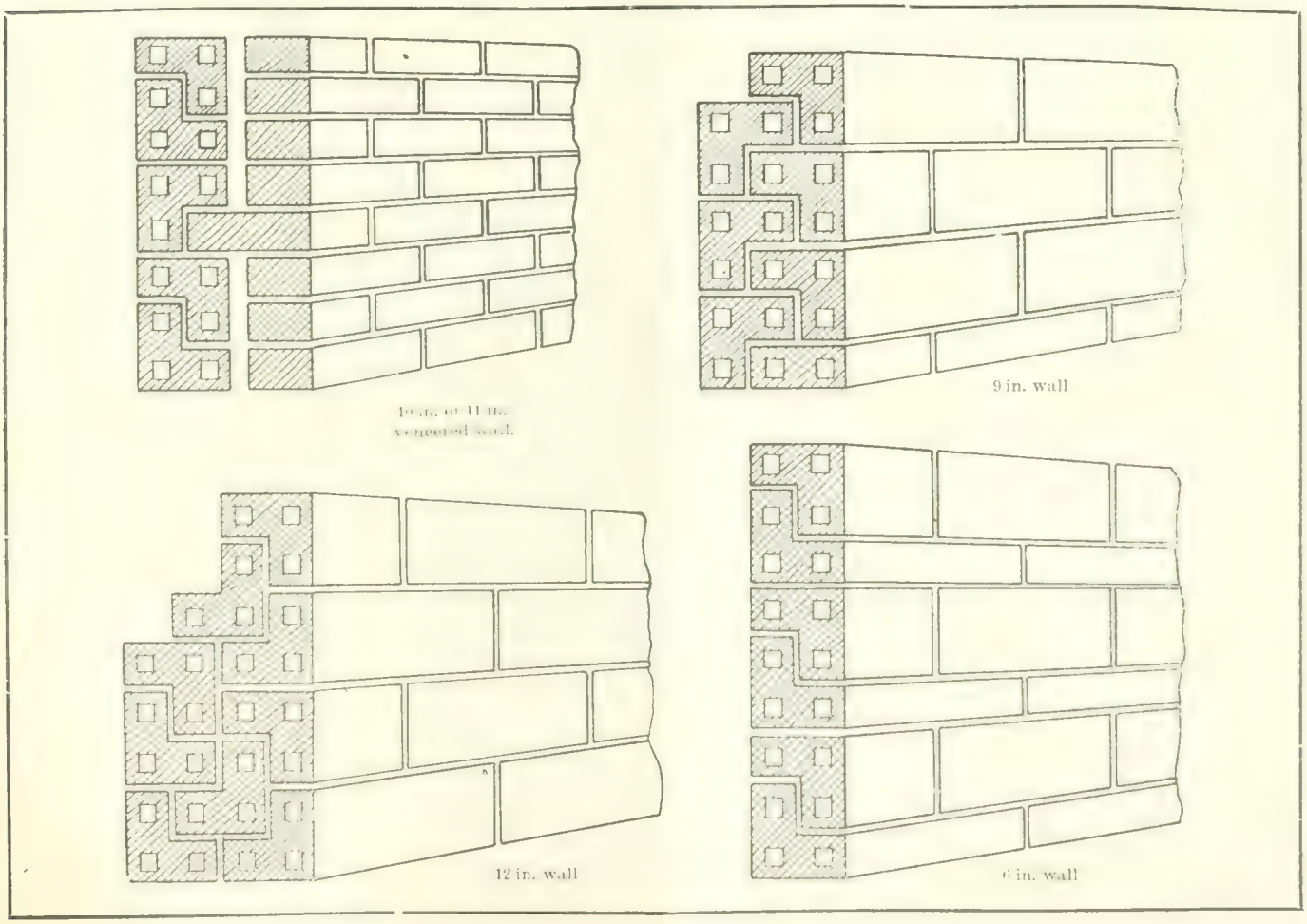
Samson Inter-Locking Tile Block

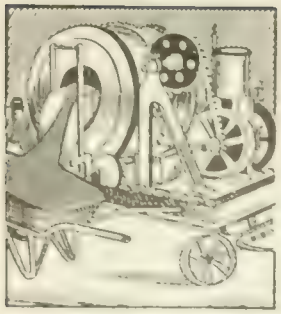
The accompanying illustrations show the Samson inter-locking tile block for which W. W. Smith, brick manufacturer, Shallow Lake, Ont., has secured patents in United States, and applied for them in Canada. With these tile it is possible to build in multiples of say 3 or 4 ins. such as 6, 9 and 12 ins. or 8, 12 and 16 ins. It can be used to back up a veneered brick wall.

The block is scored to hold plaster or stucco. This block will build in any shape, the load bearing laterals piling one above the other being laid horizontally, allows for excellent bonding. It is claimed that this tile will be cheaper than solid brick, and can be laid very cheaply.

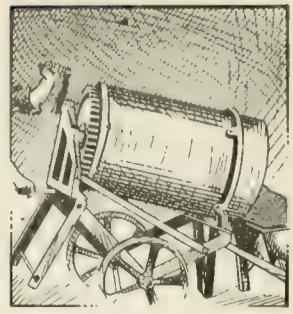
* * *

If we could see our work as others see it, there would be a sharp drop in the price of labor.





Concrete Department



Painting Over Cement

The painting of concrete and cement surfaces is a subject the master painter of the past was not called upon to consider, and I find very little information to be had bearing on the matter.

It is but one of the many new problems that changing conditions of recent years have brought to the master painters of to-day, and there is no question but that it is a matter demanding of the master painter of to-day and of the future a thorough knowledge and investigation. The rapid decrease in the lumber supply and the vast improvements made in cement construction, whereby it has been adapted to every conceivable purpose, all serve to bring it into extensive and increasing use, and I predict the time will come within the life of many of us when on exterior painting more paint will be applied over concrete or cement surfaces than on wood. It is therefore important that the master painter become educated up to this new class of work.

Treatment of Surfaces.

It must be understood that ordinary linseed oil paints cannot be applied with success directly to cement or concrete surfaces on account of the alkaline lime present in the cement, and which is subject to prolonged formation in the presence of moisture. The action of this alkali is to burn up or destroy the oil, causing rapid fading of colored paints, chalking and scaling off of the material. Therefore, it is necessary, if a linseed oil paint is to be used, that the surface be first thoroughly saturated with a neutralizing wash that will destroy the alkali action. The most approved method is to use a solution of zinc sulphate made by dissolving sulphate of zinc crystals in water in the proportion of three pounds to a gallon of water. A cement surface treated with this wash and allowed to dry can then be painted without danger from alkaline action, and with the assurance that results will be lasting, as if applied to a wood surface.

Many manufacturers now put out cement paints in liquid form, ready for use, in white and all shades, the vehicle used in these paints being alkali-proof and therefore requiring no treatment of the surface before the paint is applied. Paints of this nature are being used extensively on cement and concrete construction with the very best of results and can be obtained at a very reasonable price.

I would not, under any consideration, recommend the use of so-called "water color paints" for exterior cement coating, as they do not form a waterproof coating (one of the most important requirements of a cement paint) and offer no protection from deteriorating influences.

For Interior Cement Surfaces.

For interior cement surfaces no better material can be employed than an approved flat wall paint. Most of the leading brands of flat wall paint being of an alkali-proof nature, and where a gloss finish is desired, any ordinary gloss paint or enamel may be applied over one or two coats of the flat paint.

Surface Must Be Dry.

All new laid cement surfaces, either exterior or interior, should be allowed to become thoroughly dried out and hard before painting, and the best results have been obtained where the work has stood not less than a month before paint was applied. If the surface is dry and paint right, it will penetrate freely on the first coat, filling the pores and rendering peeling impossible, but this would not be the case if applied over a damp surface.

Exterior cement paints should dry to a flat or semi-flat finish in order to carry out the stone or cement effect. Nothing looks more out of place than a full gloss paint applied to exterior cement surfaces.

Makes Surface Waterproof.

Cement construction, especially of a lighter type, as applied to residence work, is subject to very rapid deterioration unless protected and made waterproof by the application of a suitable paint, and, while in the early history of cement construction little attention was paid to the matter, owing probably to the fact that cement work at that period was confined to rough, heavy construction, such as factories, warehouses, etc., at the present time all architects and builders recognize the fact that, aside from the embellishment and decorative feature whereby the cold, unfinished appearance of cement construction is made attractive and pleasing to the eye, that the protective and waterproof feature is of even greater importance. It is being plainly demonstrated in many cases where cement-made houses have remained long unpainted that exposed parts become water-soaked and by afterwards freezing burst the bond, causing cracking and crumbling of the construction. Therefore, with the increasing use of cement construction we may expect a greatly increased demand for the painting of these surfaces.

Painting Cement Floors.

The painting of cement floors, especially in factories, warehouses, stores, and public buildings is a necessity in order to prevent the constant powdering of the surfaces from the wear, with consequent damage and annoyance from contact with this lime dust. For cement floors, same as for other cement surfaces, the paint must be of an alkali-proof nature, but quick drying, with a good gloss, and must produce a tough, elastic, waterproof surface.

Many of the ready-prepared cement floor paints, the quick-drying vehicle of which is largely China wood oil, have been found to give excellent results, and I would recommend their use by the master painter until such time as a more complete knowledge of the

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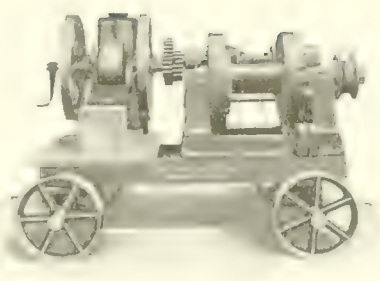

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requirements in mixing this material can be obtained. There is no doubt that, for some time to come, the master painter will be feeling his way, step by step, in this new realm of modern surface painting which cement construction has forced upon them. It will tax the brain of the paint chemist to formulate the vehicle with which to absolutely destroy the alkaline base with which cement surfaces are loaded, and it will be necessarily slow in reaching us in its fulness, for time and elements are the only factors which will buy time exposure, and to show whether they have arrived at the point of absolute elimination or perfect assimilation of the vehicle with the cement surface that is coated; therefore, we can only be patient, full of observation, testing each new process offered us, making notes from time to time of what the new processes that have been given us develop, whether they be in dissolving of the pigments used, in scaling, or in chalking. We are all aware that the goal has not been reached by any means, but constant scientific research will land us in the promised land of perfection, as it is doing in every other line of industrial developments.

Preparation of Surface to be Painted.

Prepare and close up all cracks and surface imperfections with a plaster or cement. To all surfaces apply a thorough coat of zinc sulphate, giving twenty-four hours to dry, after which apply three coats of paint, color to be selected, each coat to be thoroughly dry before the application of another. The plaster or cement must be thoroughly dry before painting.

Scrape off all old paint where necessary, close up all cracks and other surface imperfections with plaster or cement. Apply a good coat of zinc sulphate over all new cement or plaster, giving twenty-four hours to dry, after which apply two coats of paint, color to be selected, each coat to be thoroughly dry before the application of another.—R. H. Langston, in the Master Painter.

Folly of Using "Bank Run" Mixtures in Concrete

To obtain good concrete, accurate proportions are necessary. If correct proportions are not specified, or if the specified proportions are not observed, high quality cannot be obtained. When a 1:2:4 mixture is specified, there is no excuse for allowing a 1:6 mixture of cement and "bank-run" aggregate.

If the gravel pit is close at hand, a peculiar mental inertia seems to overcome the contractor, in consequence of which the cement is mixed with the bank-run material, without separating the sand and gravel and remixing in the correct proportions. This is bad practice, since in practically every bank the sand is generally twice the volume of the coarse material. But to make matters worse, if a 1:2:4 mixture has been specified, the contractor thinks he will meet the specifications by using one part of cement and six parts of bank-run. Thus, instead of approximately one-quarter of a cubic foot of cement per cubic foot of concrete, only one-sixth of a cubic foot is obtained.

The idea then occurs that rather than take the trouble to separate the fine and the coarse materials, good concrete can be obtained by using one part of cement and four parts of the bank-run, but in most gravel banks the sand is about double the quantity of the coarse gravel instead of the reverse, which is to be desired. Thus, not only is less cement used per cubic foot of concrete, but the strength is decreased by the excess of sand. A report of analyses on samples of cement and bank-run, mixed in the proportion of one part of cement to four parts of the mixed sand and gravel, indicates that the mixture runs about 1:2¾:1¾, giving a weaker mortar and a smaller yield than the 1:2:4 combination. It would be cheaper, and better concrete could be obtained, if the amount of coarse material was increased and the fine decreased. Accurate proportions can only be brought about by the use of separate materials of known size and gradation. The contractor will be repaid for the expense of screening by the greater yield per barrel of cement, and the owner will secure a better, more uniform concrete.—Engineering Record.

Area of Steel for Reinforcing Concrete Columns

The size of column and the amount of reinforcement necessary to carry a given load may be easily determined by means of the formula:

$P = Ac\ f + nf\ As.$

Where

P = Load on column in pounds.

Ac = Cross sectional area of concrete in square inches.

As = Cross sectional area of steel reinforcement in square inches.

f = Allowable stress in concrete in compression, pounds per square inch = 600 lbs.

$$n = \text{Ratio} \frac{\text{Modulus of elasticity of steel}}{\text{Modulus of elasticity of concrete}} = 15.$$

Therefore the formula becomes

$P = Ac \times 600 + 15 \times 600 \times As.$

(*Continued on page 46*)

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Make it a point to get facts and information about The Fox Floor Scraper before you buy.

The Scraper that sells for less and does better work.

With each Fox No. 1 we furnish the following accessories:

1 Clamp Block for sharpening knives.
4 Crown knives, large size.
3 Old floor knives, small size.
1 Special knife, substitute for sander.
1 Burnisher. 1 Wrench.
1 File. 1 Oilstone.
Complete set of instructions for operating.

Made by

Fox Supply Co.
Brooklyn, Wis.
U.S.A.

Price List of Building Materials Revised to Date

EDITOR'S NOTE—Great care is exercised in obtaining prices for this department. They are as accurate as it is possible for us to make them. We know, however, that because of varying conditions, different dealers' prices are bound to vary somewhat; and our purpose in publishing this department is to give readers an idea of prices, rather than absolutely definite information.

In some cases a range of prices appears. This is given to cover the variation in quotations given by different dealers, and also to cover slight variations in conditions of measurement or purchases, which space will not permit us to specify in detail.

We will be glad to give readers prices on materials not appearing here (hardwood flooring and hardware trim for instance), and also the names of dealers from whom such materials can be obtained. Such information will be supplied promptly if you write us specifying in detail what is desired.

PRICE AT MONTREAL

Hemlock Lumber

2 x 4 in. to 2 x 12 in., 8 to 14 ft.	$24.00
2 x 4 in. to 2 x 12 in., 16 ft.	26.00
2 x 4 in. to 2 x 12 in., 18 ft.	28.00 to 30.00
1 in. hemlock No. 1	22.00
No. 1 hemlock decking	23.00 to 25.00
No. 2 hemlock dimensions and 1 in.	26.00 to 30.00

Pine

1 in. common and better pine 8 to 12 in. wide, rough	$32.00 to 40.00
2 in. white pine, mill stock	29.00 to 33.00
⅞ x 8 and 10 in. pine shelving	36.00 to 45.00
⅞ x 12 pine shelving	42.00 to 50.00
No. 1 white pine flooring	40.00
No. 1 spruce flooring	30.00
No. 1 pine decking, D2S	40.00
No. 1 pine V. or beaded sheeting	40.00
No. 2 pine V. or beaded sheeting	30.00

Pine Trim for Paint Finish

4 in. casing, per 100 ft.	$1.75
5 in. casing, per 100 ft.	2.10
8 in. pine base, per 100 ft.	3.25
10 in. pine base, per 100 ft.	4.20
4 in. pine window stool, per 100 ft.	2.75

Shingles, Lath Roofing, Etc.

No. 1 pine lath	5.00
No. 2 pine lath	4.50
No. 1 spruce lath	4.00

Cedar Posts—Fence

5 in. at small end	5c. foot
7 in. at small end	7c. foot

Hardware

Nails, wire, common	$2.30 base keg
Nails, cut, common	2.50 " "
Sash weights, cast iron	1.50 per 100 lbs.
Tarred felt paper	.43 roll
Building paper	.35 roll

Brick, Tile, Terra Cotta, Sewer Pipe

No. 1 dry pressed red brick	18.00
No. 1 dry pressed buff brick	20.50
Red stock bricks	11.50
Grey stock bricks	12.00
Wire cut brick for foundation work	10.00
Fire brick	25.00
Sewer pipe, 4 inch	10c. foot
Sewer pipe, 6 inch	15c. foot

Price at Montreal—*Continued*

Cement, Plaster, Stone, Etc.

Cement (bags extra)	1.85 bbl.
Sand, for cement or brick work	1.15 ton
Lime	.30 per 100 lbs
Hydrated lime	10.00
Mortar color	5.00 bbl.
Plaster of paris	3.00
Crushed stone, 2 in.	1.50
Crushed stone, 1 in.	1.60
Crushed stone, ⅜ in.	1.75
Hardwall plaster	$9.50 to 12.00 neat
	6.50 sanded ton
Gravel	1.85 yard
Hair (plaster)	.03 per lb.

PRICE AT TORONTO

Hemlock Lumber

2 x 4 in. to 2 x 12 in., 8 to 14 ft.	$24.00 to 29.00
2 x 4 in. to 2 to 12 in., 16 ft.	24.00 to 29.00
2 x 4 in. to 2 x 12 in., 18 ft.	26.00 to 30.00
1 in. hemlock No. 1	24.00 to 28.00
No. 1 hemlock decking	26.00 to 29.00
No. 2 hemlock dimensions and 1 in.	20.00 to 24.00

Pine

1 in. common and better pine 8 to 12 in. wide, rough	$28.00 to 35.00
2 in. white pine, mill stock	29.00 to 34.00
⅞ x 8 and 10 in. pine shelving	33.00 to 40.00
⅞ x 12 pine shelving	45.00 to 48.00
No. 1 white pine flooring	34.00 to 37.00
No. 1 spruce flooring	27.00 to 32.00
No. 1 pine decking, D2S	28.00 to 33.00
No. 1 pine decking	27.00 to 32.00
No. 1 pine V. or beaded sheeting	35.00 to 39.00
No. 2 pine V. or beaded sheeting	30.00 to 35.00

No. 1 Common Yellow Pine

2 x 4 in. to 2 x 14 in., 10 to 16 ft.	$25.00 to 30.00
2 x 4 in. to 2 x 14 in., 18 to 20 ft.	29.00 to 38.00
2 x 4 in. to 2 x 14 in., 22 to 24 ft.	31.00 to 40.00

Yellow Pine Finish

4 x 6, S. & 2 sides, 12 B. & B. smoke finish	$41.00
4 x 6 " " " "	45.00
4 x 8 " " " "	45.00
4 x 6 " " " "	45.00
4 x 6 " " " steam finish	45.00 to 50.00
4 x 8 " " " "	48.00 to 50.00
4 x 6 " " " "	48.00 to 50.00
4 x 8 " " " "	50.00 to 55.00

NOTE TO READERS. We would be glad to have suggestions from readers as to the extension or modification of this list.

Use of Formula.

Required. The amount of reinforcement in a column to be 16 in. square and to maintain a safe load of 100 tons.

P = 100 tons = 200,000 lbs.
Ac = 16 × 16 = 256 sq. in.
Substituting these values in the formula, we get:
$200{,}000 = 256 \times 600 + 15 \times 600 \times As.$
$9{,}000\ As = 200{,}000 - 153{,}600.$

$$As = \frac{200{,}000 - 153{,}600}{9{,}000} = 5.2, \text{ say, } 5\tfrac{1}{4} \text{ sq. in.}$$

Same Result Obtained From Diagram.

The same result may be obtained much more easily and quickly from the diagrams in Fig. 1 and Fig. 2. For square columns, Fig. 1 is used, and for round columns, Fig. 2.

In Fig. 1 note where the vertical line marked 200,000 lbs. intersects the diagonal line marked 16 in. The nearest horizontal line to this intersection indicates the amount of reinforcement required, which is 5.25 (5¼) sq. in. By means of the table, the cross sectional area of the column may be chosen to suit conditions as nearly as possible without requiring an excessive amount of reinforcing to carry the load.

Coal Tar to Preserve Concrete Silos

The objection raised to concrete silos is that they absorb the moisture from the ensilage, thus spoiling the quality of the corn and ruining the concrete. Builders who erect these structures for farmers can overcome this difficulty by applying coal tar, thinned with gasoline, to the inside walls of the silo. This makes the silo airtight and protects the concrete from the action of the silage juice.

Safe Loads for Different Sizes of Columns.

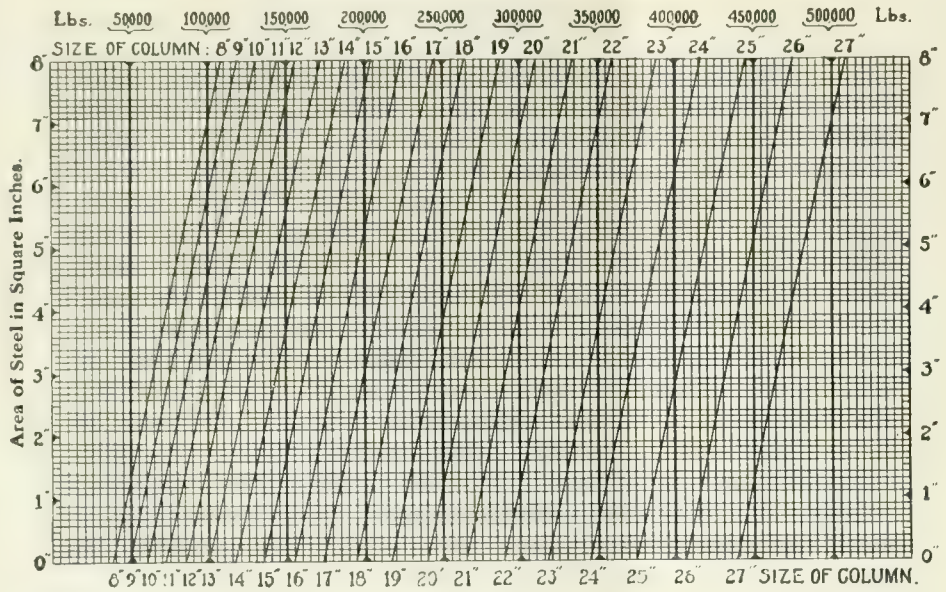

Fig. 1—Safe loads and area in square inches of steel for square columns. Reprinted from Technical Library No. 98 on Concrete Reinforcing, distributed by Joseph T. Ryerson & Son, Chicago.

Safe Loads for Different Sizes of Columns.

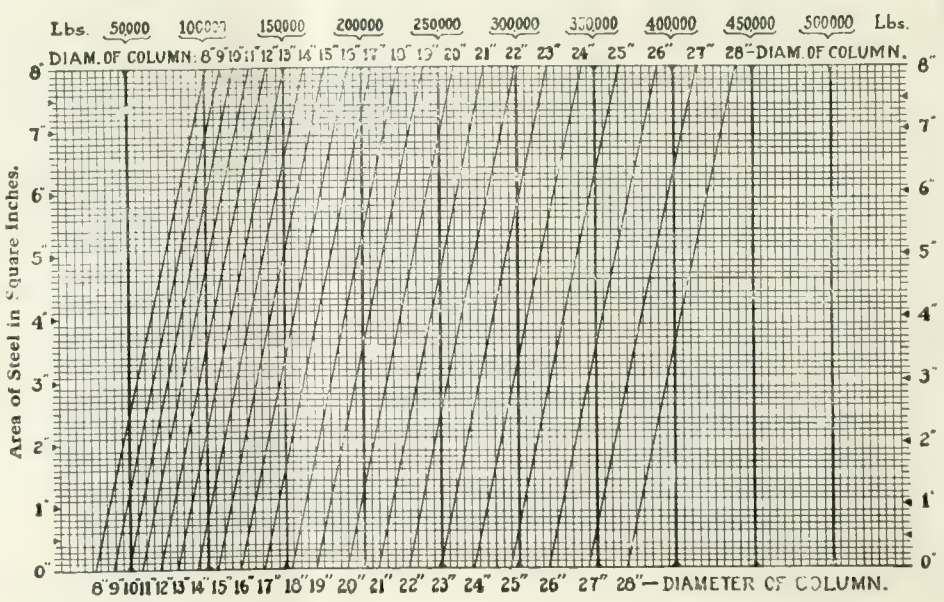

Fig. 2—Safe loads and area in square inches of steel for round columns. Reprinted from Technical Library No. 98 on Concrete Reinforcing, distributed by Joseph T. Ryerson & Son, Chicago.

Price List of Building Materials—*Continued.*

Price at Toronto—*Continued*

Pine Trim for Paint Finish

4 in. casing, per 100 ft.	$1.80 to 2.00
5 in. casing, per 100 ft.	2.00 to 2.50
8 in. pine base, per 100 ft.	2.75 to 3.25
10 in. pine base, per 100 ft.	4.00 to 4.50
4 in. pine window stool, per 100 ft.	3.00

Hardwood Trim, Flooring, Etc.

Quotations will be given on request. See editor's note above.

Shingles, Lath Roofing Etc.

XXX B. C. cedar shingles	$3.60 per M
N. B. extras	4.00
No. 1 pine lath	5.00 to 5.50 per M
No. 2 pine lath	4.75 to 5.00
No. 1 spruce lath	4.75
Roofing	1 ply--$1.60 per sq.
	2 ply— 2.00 "
	3 ply 2.40 "

Cedar Posts—Fence

5 in. at small end	.25 each
7 in. at small end	.50 each

Hardware

Nails, wire, common	$2.35 cwt.
Nails, cut, common	2.95
Sash weights, cast iron	1.75
Tarred felt paper	.65 roll
Building paper	.45

Glass

United inches	Star	D.D.
Up 25	$4.25	6.25
26-40	4.65	6.75
41-50	5.10	7.50
51-60	5.35	8.50
61-70	5.75	9.75
71-80	$6.25	$11.00
81-85	7.00	12.50
86-90	7.75	15.00
91-95		17.50
96-100		20.50
101-105		24.00
106-110		27.50

Less 20 per cent. on Star and 25 per cent on D.D. f.o.b. Toronto.

Wired glass ... 18c. to 20c. per sq. ft.

Brick, Tile, Terra Cotta, Sewer Pipe

No. 1 dry pressed red bricks	$15.00 to 18.00 per M
No. 1 dry pressed buff bricks	14.50 to 18.00
Red stock bricks	10.00 to 12.50
Sand lime brick	9.25 to 9.75
Grey stock bricks	10.50 to 12.50
Sewer brick	11.00
Wire cut brick for foundation work	9.25 to 10.50
Porous terra cotta bricks	12.00 to 15.00
No. 1 enamelled bricks, all colors, from	80.00 to 150.00
Fire brick	26.00 to 30.00
Tapestry brick	20.00 to 34.00
Sewer pipe, 4 inch	10c. foot
Sewer pipe, 6 inch	16c. foot
Verandah post caps, 16 in.	1.45 each
20 in.	1.75 "
Chimney caps, 1 flue in 1 piece	2.00 "
2 flues in 2 pieces	3.50 "
3 flues in 3 pieces	5.00 "

Cement, Plaster, Stone, Etc.

Cement (bags extra)	$1.85 bbl. (1.55 in car lots)
Sand, for cement or brick work	1.75 a yard
Lime	.38 cwt.
Hydrated lime (Canadian)	10.00 ton
Hydrated lime (American)	11.00 "
Mortar color	black, 3; red 1½
Plaster of paris	$1.50 to 2.50
Crushed stone, 2 in.	1.30 to 1.40
Crushed stone, 1 in.	1.45
Crushed stone, ⅜ in.	1.50
Hardwall plaster	8.60
	4.60 sanded
Gravel	1.80
Hair (plaster)	.07 lb.

PRICE AT WINNIPEG

Hemlock Lumber

2 x 4 in. to 2 x 12 in., 8 to 14 ft.	$20.00
2 x 4 in. to 2 x 12 in., 16 ft.	29.00
2 x 4 in. to 2 x 12 in., 18 ft.	29.00

Shingles, Lath Roofing, Etc.

XXX B. C. cedar shingles	$4.00 & 3.50 per M
No. 1 pine lath	5.75 per M
Metal lath	.16 to .20
Roofing felt (2-ply)	2.50 per roll

Hardware

Nails, wire, common	$3.00 per keg
Nails, cut, common	3.35
Sash weights, cast iron	2.75 cwt.
Tarred felt paper	1.00 per roll
Building paper	.90
Insulating paper	1.25

Glass

United inches	Single	Double
Up 25	$4.75	6.50
26-40	$5.10	$7.00
41-50	5.65	8.00
51-60	6.15	8.75
61-70	6.65	9.50
71-80	7.25	10.50
81-85		11.50
86-90		12.50
91-95		14.50
96-100		17.00
101-105		19.50
106-110		22.50

Brick, Tile, Terra Cotta, Sewer Pipe

No. 1 dry pressed red bricks	$30.00 to 40.00
No. 1 dry pressed buff bricks	30.00 to 40.00
Red stock bricks	25.00
Sand lime brick	12.00
Porous terra cotta bricks	18.00 per M
No. 1 enamelled bricks, all colors, from	110.00
Fire brick	52.50
Oriental brick	35.00
Sewer pipe, 4-inch	.11 per ft.
Sewer pipe, 6-inch	.18½ per ft.

Cement, Plaster, Stone, Etc.

Cement (bags extra	$2.60 per bbl.
Sand, for cement or brick work	1.85 a yard
Lime	.34 per bu.
Hydrated lime	12.00 per ton
Mortar color	.05 per lb.
Plaster of paris	0.75 per bag
Crushed stone, 2 in.	2.65 per yard
Crushed stone, 1 in.	2.90

NOTE TO READERS. We would be glad to have suggestions from readers as to the extension or modification of this list.

Professional Directory

Architects, Engineers, Patent Attorneys, Etc.

PATENTS *A good Patent is a property of great value*

A new invention requires protection. Patent your ideas, and we will sell it for you. Expert advice free to inventors. We carefully and promptly give information concerning Patents, home or foreign. Twenty-four years' experience. Send sketch with description for free reports and leaflets. Write or call **J. Arthur Macmurtry & Co., Patent Attorneys, 154 Bay St., Toronto, Can.** *Patents obtained, bought or sold.*

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Specializing in
Rinks, Exhibition Buildings,
Sanitary Dairy and Stock Barns.

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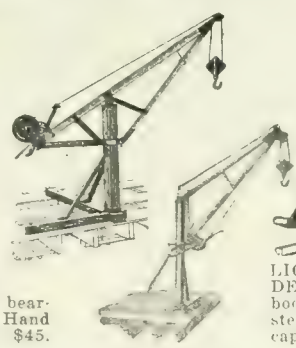
GLASS BENDERS TO THE TRADE

THE TORONTO PLATE GLASS IMPORTING COMPANY, LIMITED

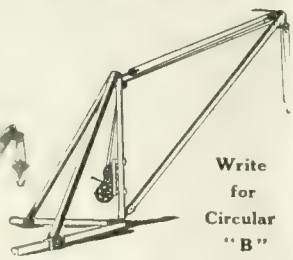
DON ROADWAY — Plate, Window, Figured, Stained, Wired, Bent, Mirror and Ornamental Glass — TORONTO

The Most COMPLETE LINE OF BUILDERS' DERRICKS MADE



Reinforced Standard 2500 lbs. capacity with geared winch complete $47.00, or for Hand and Power $51.00.

PEERLESS STEEL DERRICK full circle swing, self-lubricating bearings $43. Hand and Power $45.



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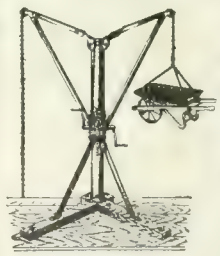
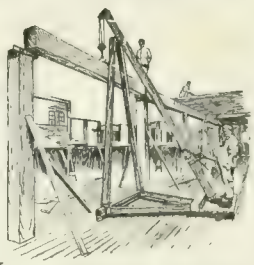
LIGHT, STRONG, STIFF LEG DERRICK with split mast and boom, capacity 1-2-3-4 tons. All steel fittings. Price according to capacity.



DOUBLE BOOM WHEELBARROW DERRICK full circle swing. Sufficient chain for 3 storey building. Price $68.



"A" FRAME BUILDERS DERRICK 1,800 lbs. capacity, $48.00; 2,500 lbs. capacity $51.00.

T. P. SETTER DERRICK. POLE DERRICK. REGULAR SETTER DERRICK.

Don't Hire Men to Carry Up Your Material, Hoist It with a SASGEN DERRICK.

At these prices you can't afford to be without one of these derricks. THEY SAVE TIME, AND THAT MEANS MONEY. CONSULT US BEFORE PLACING YOUR ORDER. SATISFACTION AND PROMPT SHIPMENT GUARANTEED.

SASGEN DERRICK CO., 1 WABASH AVENUE TORONTO, ONT.

Price List of Building Materials—*Continued.*

Price at Winnipeg—*Continued*

Crushed stone, ⅜ in.	2.90
Hardwall plaster	13.00 per ton
Gravel	1.85 per yard
Hair (plaster)	1.25 per bale

PRICE AT VANCOUVER

Shingles, Lath Roofing, Etc.

XXX B. C. cedar shingles	$2.20 & 2.10 per M
No. 1 pine lath	2.25 per M

Hardware

Nails, wire, common	$3.25 per keg
Nails, cut, common	4.25
Tarred felt paper	.90 per roll
Building paper	.70

Price at Vancouver—*Continued*

Brick, Tile, Terra Cotta, Sewer Pipe

No. 1 dry pressed red bricks	$42.00 per M
No. 1 dry pressed buff bricks	42.00
Red stock bricks	13.00
Fire Brick	45.00
Sewer pipe, 4-inch	.25 per ft.

Cement, Plaster, Stone, Etc.

Cement (bags extra)	$3.00 per bbl.
Lime	1.35 per bbl.
Hydrated Lime	4.25 per bbl.
Plaster of paris	4.50 per bbl.
Hardwall plaster	14.50 per ton
Hair (plaster)	14.50 per ton

CLASSIFIED DIRECTORY—A BUYER'S GUIDE FOR BUILDERS IN CANADA

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Davis Acetylene Co., Niagara Falls, Ont.

Air Compressors
Stuart Machinery Co., Ltd., Winnipeg.

Alabastine
Alabastine Co., Paris, Ont.

Asphalt
Canadian H. W. Johns-Manville Co., Toronto.
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Asphalt (Mastic)
Canadian H. W. Johns-Manville Co., Toronto.
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Asphalt (Paint)
Canadian H. W. Johns-Manville Co., Toronto.
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Automatic Gas-Steam Boilers
Consumers' Gas Co., Toronto.

Barrows and Concrete Carts
London Concrete Machinery Co., London, Ont.

Beaded Sheets
Metal Shingle & Siding Co., Preston.

Belting
Stuart Machinery Co., Ltd., Winnipeg.

Bevels
Henry Disston & Sons, Philadelphia.

Blinds
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.
Wilson Bros. Ltd., Collingwood.

Blinds, Venetian
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.
Wilson Bros. Ltd., Collingwood.

Boilers
Stuart Machinery Co., Ltd., Winnipeg.

Brick
Sun Brick Co., Ltd., Toronto.
Milton Pressed Brick Co., Toronto.

Bronze Cast
W. H. Thornhill Co., Winnipeg.
Dennis Wire & Iron Works Co., London.

Builders' Supplies
Bournival & Co., Montreal.
Georgian Bay Shook Mills, Midland.
Wilson Bros. Ltd., Collingwood.

Cast Stone Block Machinery
Canadian Zagelmeyer Co., Limited, Windsor, Canada.

Cars (Contractors)
Stuart Machinery Co., Ltd., Winnipeg.

Casement & Sash (Steel and Bronze)
W. H. Thornhill Co., Winnipeg.

Carts (Concrete)
London Concrete Machinery Co., London, Ont.

Ceilings (Metal)
Metal Shingle & Siding Co., Preston.

Cement (Portland)
Braid & McCurdy, Winnipeg, Man.
Ontario Lime Association, Toronto.

Cement Castings
W. J. Hynes, Limited, Toronto.

Cement Tools
Wettlaufer Bros., Toronto, Ont.

Cement Stains
London Concrete Machinery Co., London, Ont.

Chain Hoists
Stuart Machinery Co., Ltd., Winnipeg.

Chain Sprockets
Stuart Machinery Co., Ltd., Winnipeg.

Colors for Concrete
Ideal Concrete Machinery Co., London.

Columns
Batts, Limited, Toronto.
Benson & Bray, Midland.
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.
Wilson Bros. Ltd., Collingwood.
York Lumber Co., Toronto.

Combination Woodworkers
W. A. Elliott, Toronto.
Hutchinson Woodworker Co., Toronto.
Parks Ball Bearing Machine Co., Cincinnati.

Composition Capitals for Columns
W. J. Hynes, Limited, Toronto.

Concrete Block Machines
Canadian Zagelmeyer Co., Limited, Windsor, Canada.
Exeter Mfg. Co., Limited, Exeter, Ont.
Ideal Concrete Machinery Co., London.
London Concrete Machinery Co., London, Ont.
Wettlaufer Bros., Toronto, Ont.

Concrete Brick Machine
Exeter Mfg. Co., Limited, Exeter, Ont.
Ideal Concrete Machinery Co., London.
London Concrete Machinery Co., London, Ont.
Wettlaufer Bros., Toronto, Ont.

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Eureka Machine Co., Lansing, Mich.
Ideal Concrete Machinery Co., London.
London Concrete Machinery Co., London, Ont.
Stuart Machinery Co., Ltd., Winnipeg.
Wettlaufer Bros., Toronto, Ont.

Concrete Forms
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Concrete Sill, Lintel Machines
Exeter Mfg. Co., Limited, Exeter, Ont.

Concrete Tile Machines
Exeter Mfg. Co., Limited, Exeter, Ont.
Ideal Concrete Machinery Co., London.
Wettlaufer Bros., Toronto, Ont.

Concrete Reinforcements
Metal Shingle & Siding Co., Preston.

Contractors' Machinery
Stuart Machinery Co., Ltd., Winnipeg.
Wettlaufer Bros., Toronto, Ont.

Contractors' Plants
Stuart Machinery Co., Ltd., Winnipeg.

Conveying Machinery
Stuart Machinery Co., Ltd., Winnipeg.

Cornices (Galvanized Iron)
Metal Shingle & Siding Co., Preston.

Corrugated Sheets (Steel)
Metal Shingle & Siding Co., Preston.

Cranes and Hoists
Stuart Machinery Co., Ltd., Winnipeg.
Sasgen Derrick Co., Toronto.

Crestings
Metal Shingle & Siding Co., Preston.

Cross-cut Saws
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Crushers
Wettlaufer Bros., Toronto, Ont.

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London Concrete Machinery Co., London, Ont.
Sasgen Derrick Co., Toronto.
Stuart Machinery Co., Ltd., Winnipeg.

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Benson & Bray, Midland.
Georgian Bay Shook Mills, Midland.
York Lumber Co., Toronto.

Doors (Veneered)
Batts, Limited, Toronto.
Benson & Bray, Midland.
Georgian Bay Shook Mills, Midland.
Wilson Bros. Ltd., Collingwood.
York Lumber Co., Toronto.

Door Trimmings
Metal Shingle & Siding Co., Preston.
W. H. Thornhill Co., Winnipeg.

Drag Scrapers
London Concrete Machinery Co., London, Ont.

Draughting
The Patent Selling & Mfg. Agency, Toronto.

Drawing Materials
Eugene Dietzgen Co., Ltd., Toronto.

Driers
London Concrete Machinery Co., London, Ont.

Eavestrough and Conductor-Pipe
Metal Shingle & Siding Co., Preston.

Electrical Fixtures and Specialties
Duncan Electrical Co., Montreal.
W. H. Thornhill Co., Winnipeg.

Electrical Machinery
Stuart Machinery Co., Ltd., Winnipeg.

Elevator Fronts
Dennis Wire & Iron Works Co., London.

Elevators (Passenger and Freight)
Stuart Machinery Co., Ltd., Winnipeg.

Emery and Emery Wheels
Stuart Machinery Co., Ltd., Winnipeg.

Engines (Steam)
Stuart Machinery Co., Ltd., Winnipeg.

Engines (Gas and Gasoline)
Consumers Gas Co., Toronto.
Ideal Concrete Machinery Co., London.
London Concrete Machinery Co., London, Ont.
Stuart Machinery Co., Ltd., Winnipeg.
Wettlaufer Bros., Toronto, Ont.

Excavators
Stuart Machinery Co., Ltd., Winnipeg.

Felts (Asphalt)
Canadian H. W. Johns-Manville Co., Toronto.

Felts (Hair)
Canadian H. W. Johns-Manville Co., Toronto.

Felts (Plain Building)
Canadian H. W. Johns-Manville Co., Toronto.

Felts (Tar)
Canadian H. W. Johns-Manville Co., Toronto.

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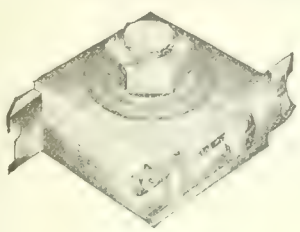

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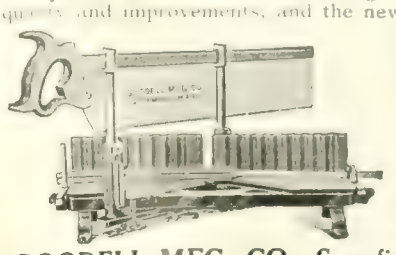

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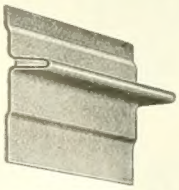

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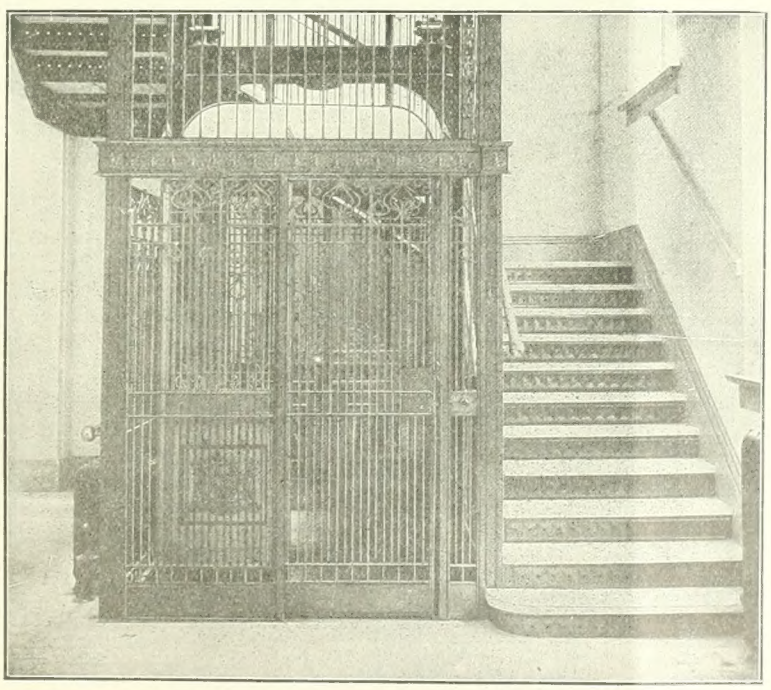

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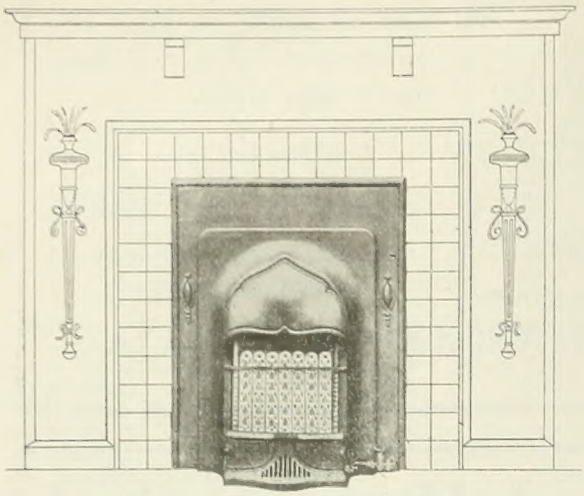

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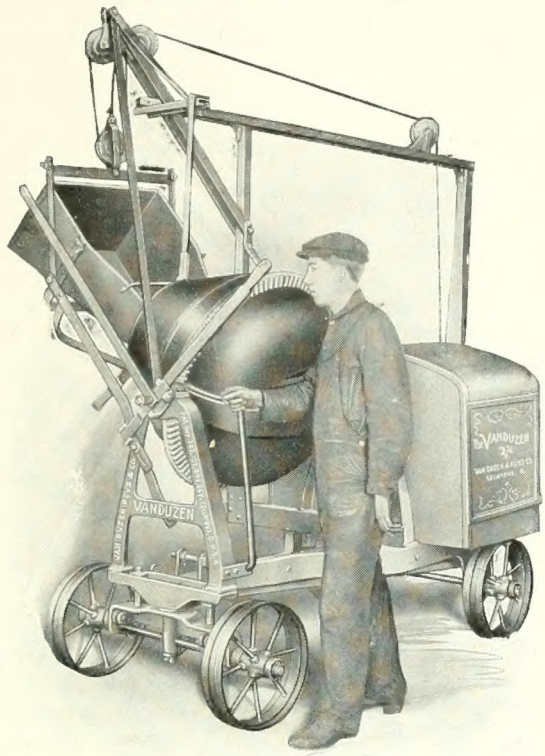

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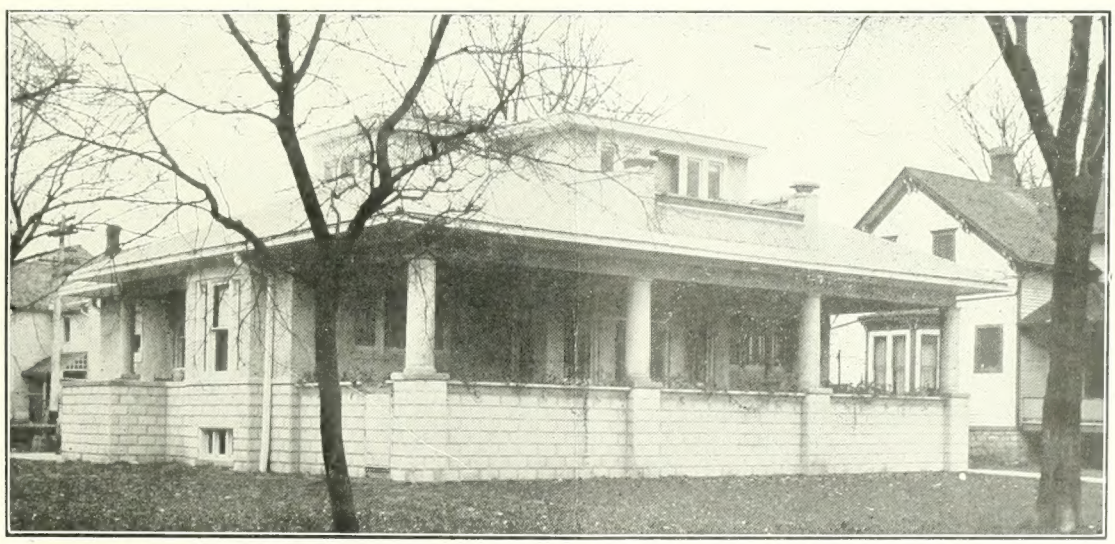

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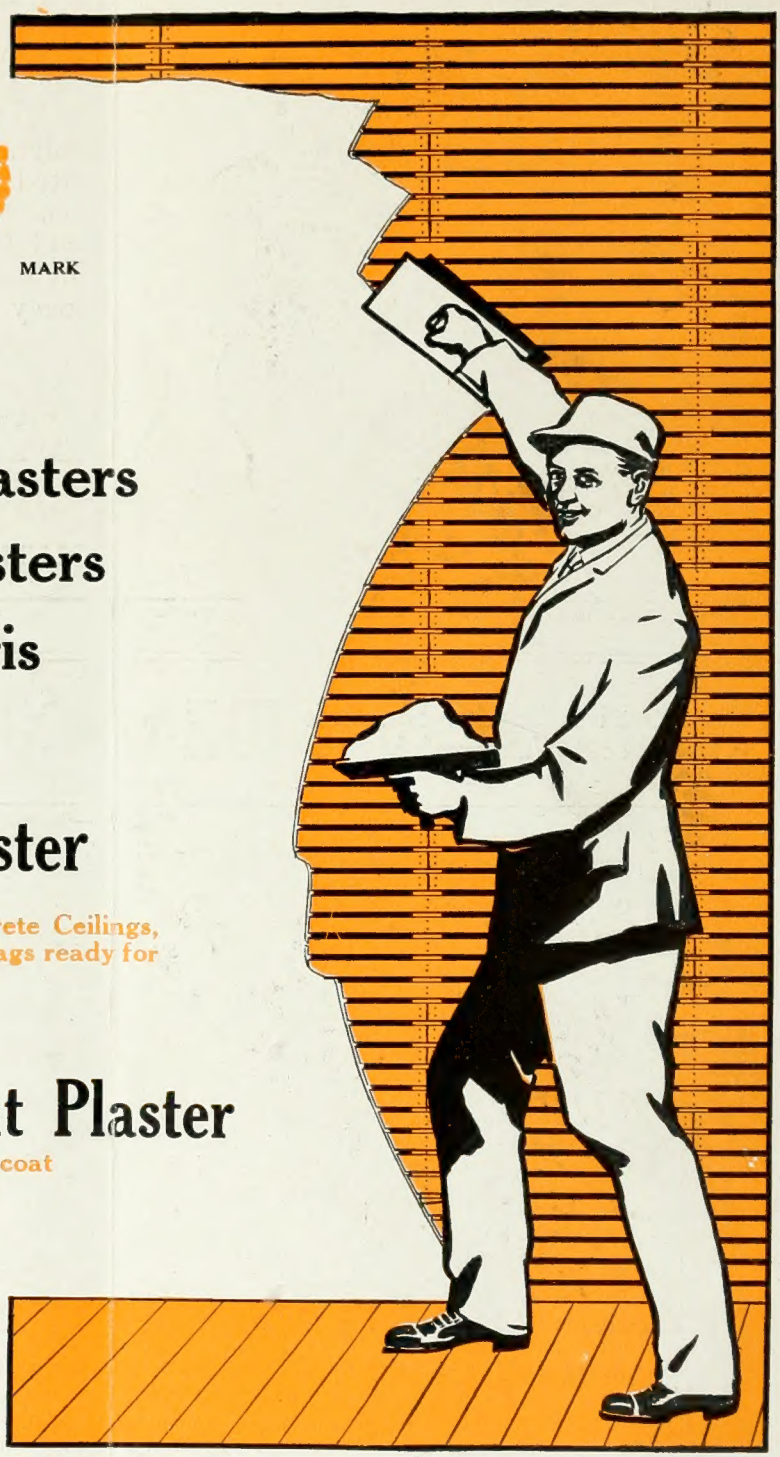

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